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Race, Socioeconomic Status, and Autonomy Support in the Classroom

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Race, Socioeconomic Status, and Autonomy Support in the Classroom

by

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Dissertation

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Doctor of Philosophy

The University of Texas at Austin

August 2021

Dedication

To my family, my friends, and all the folks fighting to both do what you love and overcome the odds. With God and the right supports, nothing is impossible.

Acknowledgements

I thank God for giving me the strength, hope, and vision I needed to complete this dissertation. I thank my parents and grandparents for nurturing my love of learning and letting me believe that the stars were never too far out of reach. I thank my dear husband, Ricardo, for going above and beyond in his care and encouragement of me throughout this difficult journey. I thank my friend, Misha, for being an awesome dissertation accountability partner and role model for me. I thank my incredible lab mates for becoming my family away from home, especially my big sister, Hae Yeon, my big brother, Joe, and my little brother, Nick. I thank Tiffany, Lisa, Tony, and Shae for counseling me through my struggles and lovingly pushing me to keep going. I thank my two amazing undergrad RAs, Sana and Lindsey, for helping me to code my data. Last, but by no means least, I thank to my amazing committee: my advisor, David, for his energetic and unwavering support and encouragement over the last six years; Marlone, for his support over the years and always being one email away; Erika, for helping me to make sense of the complexities in the theory and my data; Rob for recommending best practices for dissertating and providing challenging feedback on my ideas; Katherine for creating a space and helping me develop a system that allowed me to unleash my true writing potential.

Abstract

Race, Socioeconomic Status, and Autonomy Support in the Classroom

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The University of Texas at Austin, 2021

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Autonomy-supportive teaching practices are effective at improving the quality of students' motivation and engagement. However, little is known about whether teachers employ autonomy-supportive practices equitably with students from different social groups. Through three national studies, this dissertation aims to investigate whether and why U.S. teachers might be biased against offering autonomy support to Black students and low-socioeconomic status (SES) students. The first study examines the joint causal effect that student race and SES have on adults' likelihood of offering autonomy-supportive rationales for completing class activities. The second study examines how teachers' likelihood of self-generating autonomy-supportive rationales covaries with their own students' racial and socioeconomic composition. The third study extends the first by a) investigating the unique causal effects of student race and student SES, and b) exploring psychological mediators of these effects. Together, these three studies aim to highlight potentially consequential group disparities in students' receipt of support for autonomy and provide an account of why biases in autonomy-supportive teaching might emerge.

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Chapter 1: Introduction

In the U.S., the majority of K-12 teachers would like for their students to be more engaged than they currently are in their own learning, according to national surveys (Bridgeland et al., 2013). This desire among teachers is especially true in schools that serve a larger proportion of Black and low-socioeconomic status (SES) students (Bridgeland et al., 2013).

Greater academic engagement, however, is not a responsibility that the student bears alone; it is also highly dependent upon teachers' classroom practices (Assor et al., 2002; Blazar & Kraft, 2017; Skinner & Belmont, 1993). For instance, teacher practices that support students' sense of autonomy, defined as the sense that one's actions are performed by choice as a meaningful expression of oneself (Deci & Ryan, 1987), can have powerful effects on student engagement in the classroom. Autonomy is thought to be a universal psychological need (Deci & Ryan, 2002) that, when satisfied by teachers' practices, moves students to want to engage more deeply and actively in classroom activities (Jang et al., 2010; Patall et al., 2019). Autonomy support helps students see engagement in learning as self-endorsed and fulfilling (Reeve, 2012; Vansteenkiste, Simons, Lens, et al., 2004), and it is often a causal antecedent to better educational outcomes (Vansteenkiste et al., 2005; Vansteenkiste, Simons, Lens, et al., 2004). This makes autonomy support a promising classroom practice for narrowing group-based inequality in outcomes, provided that teachers offer it equitably across groups.

Are autonomy-supportive practices distributed equitably across students from different racial, ethnic, and socioeconomic groups? They may not be. It is widely known that, in the U.S., the quality of education that students receive is highly stratified with respect to race and social class (Gamoran, 2008; Kao & Thompson, 2003), as is access to

opportunities for upward mobility afforded by high quality education (Chetty et al., 2014; Li et al., 2018). However, whether and why there might be race and social class disparities in teachers' use of autonomy-supportive motivational practices, which promote higher quality educational experiences, is not fully known, and it must be known in order to understand the role that autonomy support might play in either maintaining or reducing group disparities in educational outcomes. Filling this gap in knowledge is the primary purpose of the present dissertation.

MIGHT THERE BE INEQUITIES IN USE OF AUTONOMY-SUPPORTIVE PRACTICES?

There is a long and lingering history of race- and class-based restrictions and threats to autonomy within U.S. society (Rothstein, 2017), especially in education. For much of U.S. history, Black people were legally barred from receiving formal public schooling solely because of their race (Williams, 2005), while both Black and low-SES K-12 students continue to be denied access to high-quality education through de facto school and residential segregation (Reardon et al., 2019). Thus, a precedent has been set for denying Black and low-SES students support for feeling autonomously engaged in their own education.

In addition to these systemic barriers, Black and low-SES students may also face social-psychological barriers to receiving support for a sense of autonomy while learning. A number of prominent race- and class-based stereotypes persist within U.S. society; these stereotypes negatively characterize the innate motivation, self-control, and intellectual potential of Black people (Cox & Devine, 2015; Devine & Elliot, 1995) and people from low-SES backgrounds (Feldman, 1972; Fiske et al., 2002). Such stereotyping could have direct implications for how teachers might view students from these groups with respect to their need and capacity for autonomous engagement in learning.

Research on autonomy supportive teaching, to date, has been largely disconnected from an analysis of the disparate education-related experiences that people from different racial and socioeconomic groups are having within the U.S. Instead, this research has focused on autonomy as an innate and universal psychological need (Deci & Ryan, 2002; Ryan & Deci, 2000), and on autonomy-supportive practices as varying in psychological significance across cultural contexts (Reeve et al., 2018), without much discussion of how and why students within the same cultural context could systematically receive unequal support for autonomy as a function of their social group membership. As a result, basic questions remain unanswered about whether the racially- and socioeconomically-biased realities of the U.S. cultural context might be reflected in teachers' use of autonomy-supportive practices within U.S. classrooms. Do students from different racial and socioeconomic groups differ in their likelihood of receiving autonomy support from their teachers? If so, why? My dissertation will begin to fill this gap in knowledge.

WHAT THE PRESENT DISSERTATION WILL INVESTIGATE

Theoretical Aims

The theoretical aims of my dissertation are to link research in the fields of psychology, education, and sociology for the purpose of conceptualizing how the prevalence of autonomy-supportive teaching might vary with students' race and SES within the U.S. The remainder of this chapter (Chapter 1) offers a review of the research literature most pertinent to these theoretical aims. This review starts by setting up self-determination theory (SDT; Ryan & Deci, 2017c) as a framework for understanding the nature of autonomy and the effects of autonomy-supportive teaching on student engagement. The review ends by bringing SDT-based research on the factors that predict autonomy-supportive teaching (e.g., Pelletier et al., 2002; Reeve, 2009) – research which

has been largely race- and SES-neutral – into a conversation with research showing that those same factors vary meaningfully with student race and SES (Alexander et al., 1987; Katsh-Singer et al., 2016; Moon et al., 2003; Solomon et al., 1996).

Empirical Aims

The empirical aims of my dissertation are to investigate how and why students' race and SES might influence their receipt of autonomy support from teachers in the U.S. The particular autonomy-supportive teaching practice that this dissertation focuses on is rationale provision, defined as the delivery of explanations of why students might find it worthwhile to put forth effort on an activity (Reeve et al., 2002; Steingut et al., 2017). The paradigm used to elicit rationale provision from teachers is one in which they, first, read a vignette about a student who does not see the point of completing a class activity, and then are asked to indicate what they would say to motivate the student to engage. One major reason for this focus on rationale provision is that evidence-based frameworks for judging the autonomy-related impact of a rationale's contents already exist (Kasser & Ryan, 1996; Steingut et al., 2017), allowing for a fine-grained analysis of how autonomy support varies even among teachers who do provide rationales. Using a vignette design to study rationale provision allows for an investigation of how the autonomy-related content of teachers' rationales changes in response to changing the race and SES of the hypothetical student, holding all else constant. This design also facilitates explorations of causal mediators of the effect that manipulating student race and SES has on teachers' rationale content.

Research Questions

This dissertation seeks to address two research questions. Research Question 1, investigated across two studies, asks whether Black or lower-SES students might be less

likely than White or higher-SES students to receive autonomy-supportive rationales from teachers. Study 1 (described in Chapter 2) is a randomized experiment conducted within a nationally representative sample of U.S. adults that aims to test whether jointly manipulating the race and SES of a hypothetical student impacts adults' likelihood of choosing an autonomy-supportive rationale as the best option for motivating the student. The strengths of this study lie in its ability to demonstrate causality, and also in the generalizability of its findings. Still, its measurement of autonomy support through the selection of researcher-generated rationales is a limitation, one that the second study aims to address. Study 2 (described in Chapter 3) uses a correlational design and data from a national survey of U.S. 9th grade math teachers to examine whether teachers' likelihood of composing an autonomy-supportive rationale for the purposes of motivating a hypothetical student in their class varies with the racial and socioeconomic composition of their real-life students. Though it cannot speak to the causal influence that classroom racial and socioeconomic composition have on teachers' provision of autonomy support, the strengths of this second study lie in its analysis of teachers' self-generated language, and also in the generalizability of its findings.

Having investigated the possibility that Black and lower-SES students have different access to teacher autonomy support than White and higher-SES students do, the empirical aims of this dissertation then shift to addressing Research Question 2. This second question investigates teacher beliefs and attitudes that might mediate the effect of student race and SES on teachers' provision of autonomy-supportive rationales. This question will be investigated in Study 3, the methods of which are proposed in Chapter 4. This study will seek to conceptually replicate the causal test performed in Study 1 within a new national sample of U.S. adults, and extend Study 1 by exploring psychological factors that might explain the causal effect. The strengths of this third study are expected to lie in

its ability to disentangle the unique effects that student race and student SES have on teacher autonomy support, and assess potential mediating mechanisms.

CONTRIBUTION OF THE PRESENT DISSERTATION

This dissertation offers several theoretical, socio-cultural, and practical contributions. For one, this work stands to make a theoretical contribution to SDT by providing an account of why the prevalence of autonomy-supportive teaching might vary with sociodemographic factors like student race and SES. Such an account could help clarify the nature of those practices by uncovering belief systems that underlie and co-occur with them. A second contribution of the dissertation is that it challenges harmful narratives which suggests that Black and low-SES students are inherently less motivated to learn by exposing how these students in fact receive less support than other students do for deep valuing of what they are learning. Thus, this dissertation provides a vital counternarrative. One final contribution is that the dissertation could inform a future program of research. This research can test whether interventions that target biases in teachers' autonomy-related beliefs, attitudes, and practices have the potential to reduce race- and class-based inequalities in educational outcomes.

SENSE OF AUTONOMY AND ITS ROLE IN ACADEMIC MOTIVATION AND ENGAGEMENT

Overview of SDT and Defining Autonomy

Self-determination theory (SDT) is a psychological theory aimed at identifying the individual and social factors that either facilitate or undermine "the inherent human capacities for psychological growth, engagement, and wellness", i.e., human flourishing (Ryan & Deci, 2000, 2017c, p. 3). SDT posits that, although humans naturally desire growth, integration, and well-being within the social environments that they inhabit, their

ability to do so is limited in part by the degree to which the conditions of that environment offer them support for meeting certain essential psychological needs. The need for autonomy – as noted, the sense that one's behaviors are willingly performed, as a meaningful expression of the self – is theorized to be one such essential need (along with the needs for competence and relatedness; Deci & Ryan, 1987; see Chirkov et al., 2003). The opposite of a sense of autonomy is heteronomy, which is the sense that one's behaviors are controlled by forces other than or distal to the self. To the extent that a social context affords individuals satisfaction of their need for autonomy, individuals within it will be more likely to flourish. However, to the extent that a context thwarts satisfaction of this need and instead fosters a sense of being controlled, individuals within it will fall short of reaching their full potential. Thus, a sense of autonomy is an important psychological resource to possess in any context.

Autonomy and Motivation Quality

In order to understand the potential for certain teacher practices (e.g., rationale provision) to influence students' sense of autonomy in the classroom, it is first necessary to understand how students' sense of autonomy is directly related to the motives they have for performing a behavior. SDT posits that, in general, human motives can be categorized into six qualitatively different forms and arranged along a continuum representing the degree to which one's behavior feels willed by the self, i.e., autonomous (see Table 1.1; Ryan & Connell, 1989). As will be discussed in more detail later, teacher

Table 1.1. Taxonomy of Motivations and Behavioral Regulations.

Type of Motivation	Amotivation	Extrinsic Motivation				Intrinsic Motivation
Style of Behavioral Regulation	Non-Regulation	External Regulation	Introjected Regulation	Identified Regulation	Integrated Regulation	Intrinsic Regulation
Perceived Locus of Causality (Relative to Core Self)	Impersonal	External	Somewhat External	Somewhat Internal	Internal	Internal
Underlying Cause of Behavior Regulation	Non-valuing; Lack of Incentive	Commands; External Rewards or Punishments	Guilt; Shame; Self-Presentation; Contingent Self-Esteem	Perceived Utility; Perceived Personal Relevance	Congruence with other fully-internalized values or commitments	Interest; Enjoyment; Curiosity
Internalization of Behavior Regulation	NA	Not Internalized	→		Fully Internalized	NA
Relative Form of Motivation	NA	Controlled		Autonomous		
Self-Determination of Behavior	Non-Self-Determined		→			Fully Self-Determined

Note: Adapted from Ryan & Deci (2000) and Vansteenkiste et al. (2018).

practices have the potential to influence students' sense of autonomy by influencing what form of motivation students have.

Table 1.1 shows that the lowest quality of motivation that individuals can have for performing a behavior is *amotivation*, a state in which they lack any reason or intention to engage in a behavior. Amotivation is considered neither an autonomous nor a controlled form of motivation and can result from individuals being either unaware of or indifferent to the importance and value of performing a behavior. In contrast, the highest quality of motivation that individuals can have is intrinsic motivation – i.e., being driven to engage in a behavior because one considers it to be inherently interesting and rewarding. Intrinsic

motivation is considered an autonomous form of motivation because it reflects engagement that is completely regulated by the self's natural preferences and curiosity.

In the center of SDT's continuum of motivation quality (Table 1.1) is extrinsic motivation. Extrinsic motivation differs from amotivation and intrinsic motivation in that extrinsically motivated individuals have a reason to engage in a behavior, but not due to inherent enjoyment of the behavior. Instead, extrinsically motivated individuals engage because they believe that engagement could bring about desirable outcomes separable from the behavior itself. SDT divides extrinsic motivations into four subtypes that vary in the degree to which the individual has internalized and integrated the value of a behavior within themselves, with deeper internalization resulting in more autonomously motivated behavior. The first subtype of extrinsic motivation, external regulation, reflects engagement caused by and conditional on the presence of externally controlled incentives to behave (e.g., rewards, punishments, deadlines). External regulation is considered the most controlling form of extrinsic motivation because the individual would readily cease to engage in the behavior in the absence of those incentives. The second subtype, introjected regulation, reflects being motivated to engage in a behavior because one's self-worth, mood, and perceived regard by others are conditional upon meeting weakly-endorsed standards of engagement. Introjected regulation is considered to be another relatively controlled form of extrinsic motivation because the individual puts pressure on themselves to behave in ways that others think is valuable and that they ought to value as well, but do not fully (and may actually resent). Similar to externally regulated behaviors, behaviors regulated by introjection would cease to be performed in the absence of these enduring internal pressures to comply.

The third subtype of extrinsic motivation, identified regulation, reflects being motivated to engage in a behavior because one genuinely believes that its outcomes are

worthwhile or important. Identified regulation is considered a relatively autonomous form of extrinsic motivation because the value of the behavior is self-endorsed, and thus the individual willingly takes on the responsibility of managing their own engagement. Lastly, the final subtype of extrinsic motivation, integrated regulation, reflects being motivated to engage because a behavior is compatible with and critical for other aspects of the self (e.g., one's identity, psychological needs, well-internalized goals, and values). Integrated regulation is considered the most autonomous form of extrinsic motivation because the individual sees the behavior as consistent with and vital to the self.

The studies included within this dissertation investigate teacher autonomy support in situations where a student is situationally amotivated to complete a class assignment. When a student is entirely lacking a reason to engage in a behavior, teachers have a tremendous opportunity to apply practices that can help shift the student's motivation further to the right on the SDT continuum of motivation (Table 1.1). Any such shift would be likely to result in marked improvements in the quantity of students' motivation (see Vansteenkiste, Simons, Soenens, et al., 2004). However, the quality of students' subsequent motivation would further depend upon what practices the teacher used to prompt the shift – i.e., practices that foster more autonomous (versus controlled) forms of motivation. This point will be discussed in more detail later.

Having reviewed the different forms of motivation proposed by SDT, the next section will briefly review research on the effect that each form of motivation can have on individuals' outcomes, particularly in academic domains.

Autonomy and Academic Engagement

Ample research based in SDT has investigated how the quality of students' academic motivation relates to the quality of their academic engagement; this research has

found that a strong sense of autonomy predicts greater self-reports and observations of behavioral engagement (e.g., greater persistence) and deep cognitive engagement (e.g., connecting related concepts; Patall et al., 2016, 2018; Vansteenkiste et al., 2008; Vansteenkiste, Simons, Lens, et al., 2004). These findings suggest that perceiving that one's learning-related behaviors are chosen by the self helps to make students more willing to act in ways that foster learning (see Patall et al., 2008, 2016) and, conversely, perceiving that one's behaviors are either pressured or unmotivated may make students willing to do only the minimum necessary to appease their teachers. A more thorough review of how amotivation, autonomous motivation, and controlled motivation relate to student engagement follows.

Several studies have shown that greater amotivation towards school is associated with more shallow cognitive and behavioral engagement with educational activities. For example, college-aged students who report more apathy towards school tend to self-report more rote memorization of lectures, textbooks, and study materials (Walker et al., 2006). They also report greater intentions to drop out of their degree program (Litalien et al., 2017) and less commitment to completing college (Phinney et al., 2006). Several investigations of the link between amotivation and engagement have been conducted in the context of physical education; one such study found that high school students' observed effort and persistence in PE class decreased as class-level average reports that the class felt like a waste of time increased (Aelterman et al., 2012). Thus, perceiving that one has a good reason to engage in class activities seems to be an important precondition for meaningful engagement.

Yet, even if students are motivated to engage in learning, not all forms of motivation are equally supportive of high-quality engagement. Generally, SDT-based research finds that students who report more autonomous forms of motivation (i.e.,

identified regulation, integrated regulation, or intrinsic motivation) tend to report and show greater persistence and deeper engagement in learning than students who report more controlled forms (i.e., external regulation or introjected regulation) (Vansteenkiste et al., 2012). For example, college students who report higher levels of external regulation (e.g., going to college in order to earn a higher salary) tend to self-report more superficial engagement with learning materials (Walker et al., 2006) and earn lower GPAs (Litalien et al., 2017). Students who report higher levels of introjected regulation (e.g., who work hard in school in order preserve their self-worth and high regard by others) also report more boredom in high school classes (van der Kaap-Deeder et al., 2016), earn lower college GPAs (Litalien et al., 2017), and report only somewhat greater persistence at difficult school work or use of use of cognitive strategies that promote deep learning (Vansteenkiste et al., 2012). In contrast, high school students who report greater intrinsic motivation (e.g., greater enjoyment of a class) tend to also report greater effort, attention, and participation in class (Froiland & Worrell, 2016) and greater use of deep learning strategies (Walker et al., 2006). Students who report greater identified regulation of learning (e.g., who believe that what they are learning is important or useful) tend to put forth more effort on learning activities (Assor et al., 2009) and they also prioritize studying more and earn higher GPAs (Critcher & Ferguson, 2016). Lastly, when students perceive education as central to their identity (e.g., as a future wage-earner; Destin & Oyserman, 2010) or facilitative of their well-internalized goals (e.g., to achieve social mobility; Browman et al., 2019), they report and show greater time and effort on academic activities.

In summary, the degree to which students are autonomously motivated to learn (as opposed to being amotivated or having controlled motivation) has clear and predictable consequences for the quality of their engagement in school, as well as their academic outcomes. However, it is important to note that, while individual differences in autonomous

motivation (i.e., volitional engagement with one's environment) and controlled motivation (i.e., pressured engagement with one's environment) do exist (Deci & Ryan, 1985), sense of autonomy is largely situationally determined. In other words, it is a mutable, psychological experience that is heavily influenced by the social context in which a student is embedded. It is therefore important to consider how the autonomy-related teaching practices that teachers use within their classrooms can either help or hinder students' sense of autonomy while learning.

AUTONOMY-SUPPORTIVE TEACHING AND ITS IMPORTANCE DURING ADOLESCENCE

Autonomy-Related Teaching Practices

Teachers have considerable influence over the quality of their students' motivation in the classroom. To better support students' sense of autonomy while learning, teachers can implement autonomy-supportive teaching practices – which include letting students make choices, acknowledging and accepting their expressions of negative affect, providing explanatory rationales, and using inviting language such as "You can…" or "You may…" (Assor et al., 2002; Reeve, 2009). These practices allow students to perceive that they have a say in how they think, feel, or behave within the classroom, as opposed to being pressured to engage a certain way. In classrooms where teachers make use of these and other autonomy-supportive teaching practices, students tend to report higher levels of intrinsic, identified, and integrated regulation (Patall et al., 2018; Reeve & Jang, 2006), and they also tend to exhibit deeper engagement in learning (Assor et al., 2002; Jang et al., 2010; Patall et al., 2018; Skinner & Belmont, 1993; Vansteenkiste et al., 2012).

In contrast, some teaching practices – collectively referred to as controlling teaching practices – have the effect of thwarting students' sense of autonomy in the classroom. Controlling teaching practices include such tactics as introducing external

incentives for participation, conditioning positive regard of students on their participation, and using directive, pressure-inducing language such as “You should…” or “You must…” (Assor et al., 2002; Reeve, 2009). These practices lead students to feel pressured to think, feel, or behave ways that the teacher wants, and prevents them from deeply internalizing the value of the learning materials. Perhaps not surprisingly then, students tend to report higher levels of both external regulation and introjected regulation in classrooms where teachers use more controlling teaching practices (Patall et al., 2018). In summary, autonomy-supportive teaching practices lead students to experience more autonomous motivation to engage in learning, while controlling teaching practices lead students to experience more controlled motivation to engage.

Just as students’ engagement increases as teachers’ use of autonomy-supportive practices increases, teachers’ use of autonomy-supportive practices tends to increase as their perception of students’ autonomous motivation and engagement increases (Reeve, 2012; Skinner & Belmont, 1993; Vallerand et al., 1997; Van den Berghe et al., 2015). In other words, teachers’ and students’ autonomy-related behaviors in the classroom are reciprocally linked. This linkage indicates the concerning potential for teachers to withhold autonomy support from the students who are actually in greatest need of such support, i.e., those struggling to feel willingly engaged in class activities (e.g., the situationally amotivated). Withholding autonomy support would have an ironic effect of exacerbating disengagement among these students, which would further fuel teachers’ use of controlling motivational practices and create a negative cycle of student disengagement and controlling instruction.

Rationale Provision as Autonomy Support

One critically important autonomy-supportive motivational practice identified by SDT is rationale provision, i.e., explaining to students why it might be worthwhile for them to put forth effort on an activity. It is this practice that the present dissertation closely investigates as a vehicle through which social disparity in autonomy support could emerge in U.S. classrooms.

Correlational studies generally find that students show and report greater autonomous motivation, greater valuing of a class, deeper engagement, and better performance in classrooms where the teacher regularly offer them rationales for learning (Assor et al., 2002; Jang et al., 2010; Patall et al., 2013, 2018), though this relationship does not always emerge (Reeve & Jang, 2006). In addition, experimental and meta-analytic studies have shown that students who are randomly assigned to receive a clear rationale for completing a learning activity report higher levels of autonomous motivation and demonstrate greater persistence on the activity than do students who are randomly assigned to a control message (Deci et al., 1994; Steingut et al., 2017).

One reason why rationale provision generally leads to increased autonomous motivation is that rationales typically explain to students how engaging in a potentially uninteresting or unvalued learning activities could have valuable outcomes (e.g., good grades, stronger skills, career success). Discovering this connection is likely to increase students' willingness to engage meaningfully with classroom activities (Crumpton & Gregory, 2011), especially if they were initially amotivated to do so. Yet, SDT asserts that all rationales are not created equal (Ryan & Deci, 2017c; Vansteenkiste et al., 2018). As will be reviewed below, some are better than others at helping students deeply internalize and assimilate the value of learning activities within themselves, and thus experience the more autonomous forms of extrinsic motivation.

Intrinsic & Extrinsic Life Goals

One way that rationales can vary in autonomy-supportiveness is in whether they frame engagement in learning as instrumental to achieving either intrinsic or extrinsic life goals. Intrinsic life goals are those which, when pursued, contribute directly to the satisfaction of one's basic psychological needs for competence, relatedness, and autonomy (Kasser & Ryan, 1993, 1996). Examples of intrinsic life goals include personal growth, forming meaningful relationships, and contributing to a community. Conversely, extrinsic life goals are those which, when pursued, contribute only indirectly to satisfaction of the basic psychological needs and, in some cases, thwart need satisfaction altogether. Examples of extrinsic life goals include financial success, fame, and physical attractiveness (Kasser & Ryan, 1993).

Numerous lab studies that experimentally manipulated the content of researcher-generated rationales have shown that college-aged participants who receive rationales that frame learning activities as facilitative of intrinsic life goals demonstrate deeper cognitive engagement and greater persistence at learning than students who receive rationales that connect the activity to extrinsic life goal pursuits (Vansteenkiste et al., 2005; Vansteenkiste, Simons, Lens, et al., 2004; Vansteenkiste, Simons, Soenens, et al., 2004). A pair of online studies found that college students who received an intervention that framed learning as facilitative the goals of personal growth and prosocial impact demonstrated greater persistence on learning activities than students in a control condition (Yeager et al., 2014). Together, these studies suggest that the positive causal effect of intrinsic goal rationales on student behavior may be mediated by increases in students' autonomous motivation and persistence, which leads them to pursue deeper understanding of learning material, even if they did not find the material intrinsically interesting.

Recent research on the benefits of goal pursuits has shown that, in some cases, it is not what life goal individuals pursue that matters for their subsequent motivation and well-being, but why they are pursuing it. For example, although money is an extrinsic motivator of behavior, money-related goals may be pursued either for controlled reasons (e.g., attracting attention; pleasing others) or for autonomous reasons (e.g., donating to charity; experiencing personal freedom) (Landry et al., 2016). Even relational goals (i.e., goals undertaken on account of other people, such as community members or family) can be pursued either for controlled reasons (e.g., meeting expectations; fear of letting others down) or for autonomous reasons (e.g., importance to a close other; enjoyment of the people involved) (Gore & Cross, 2006). Studies have shown that college students and professionals who aspire to financial success for more autonomous reasons report greater psychological well-being than those who do so for more controlled reasons (Carver & Baird, 1998; Landry et al., 2016). Likewise, college student who pursue relational goals for autonomous reasons report spending more effort and progress on their goals than those who pursue relational goals for controlled reasons (Gore & Cross, 2006). These findings suggest that, when proposing financial goals and relational goals as rationales for students to engage in learning activities, teachers should take care to avoid recommending controlling reasons for pursuing these goals. This point will be revisited later.

Personal Relevance & External Motivators

The content of teachers' rationales can vary in still other ways that might matter for students' subsequent sense of autonomy while learning. For example, rationales that explain how a learning activity is meaningfully related to students' intrinsic interests (e.g., hobbies) and well-internalized goals (e.g., their desired career) help students see the activity as compatible with existing meaningful aspects of the self, thereby increasing their

valuing of the activity, willingness to engage, and subsequent effort (Frymier & Shulman, 1995; Reeve et al., 2002; Vansteenkiste et al., 2018). Additionally, rationales that help students understand the personal utility of learning materials can also promote their valuing of the material (Patall et al., 2013), as one experiment showed that students reported greater interest and valuing of a novel math technique after both receiving and self-generating examples of how their newfound math skills could be useful in life (Canning & Harackiewicz, 2015).

In contrast, rationales that may be expected to promote a sense of controlled motivation within students are those which frame completion of learning activities as instrumental to receiving external rewards (e.g., earning high grades), overcoming evaluative obstacles (e.g., passing a class; graduating high school), or addressing ego concerns (e.g., competing with other students; meeting other people's expectations). Less is known about the effect that rationales with these contents might have on the quality of students' motivations to learn. However, related research has shown that messages from teachers which emphasize grades (Butler & Nisan, 1986), competition with other students (Anderman et al., 1999), and meeting others' expectations (Reeve et al., 2002) tend to reduce students' interest in and valuing of learning activities, while also increasing their sense of being pressured to learn. Thus, while rationales with such contents may produce a higher quantity of motivation within students, they would not necessarily produce higher quality motivation (see Cerasoli et al., 2014).

In summary, although rationale provision is generally classified as an autonomy-supportive practice, the content of teachers' rationales can nevertheless vary in ways that matter for their students' subsequent feelings of autonomy while learning. Autonomy-supportive rationales are those that frame learning activities as meaningfully related to the fulfillment of intrinsically-rewarding life goals, the fulfillment of financial success goals

for autonomous reasons, to students' existing interests, values, or personal goals, and to the development of personally useful skills. Conversely, controlling rationales are those that frame learning activities as meaningfully related to the fulfillment of extrinsically-rewarding life goals, the fulfillment of relational goals for controlled reasons, receiving external rewards, overcoming evaluative obstacles, and managing ego concerns. While offering students the former type of rationales is likely to help promote a sense of deep personal valuing and enjoyment of learning activities, offering them the latter type would likely promote feelings of being pressured to engage.

Importance of Autonomy Support During Adolescence

Though perceiving that one's social contexts support one's sense of autonomy is important across the lifespan (Ryan & Deci, 2017c), autonomy support is especially important during the developmental stage of adolescence (Yeager et al., 2017). Compared to children, adolescents have a much stronger expectation that the adults in their lives will allow them to make their own decisions and respect their preferences (Ruck et al., 1998). Adolescents also tend to be more sensitive to whether the adults in their lives are granting them an appropriate amount of respect (Yeager et al., 2018) – e.g., by not trying to control their behavior as they would a child's. It therefore becomes crucial during the adolescent years for teachers to provide support for students' sense of autonomy, lest by withholding respectful treatment from teenage students, teachers undermine their students' willingness to be respectful of the teacher in return (see Okonofua, Walton, et al., 2016).

Providing autonomy support during adolescence is also important because students' intrinsic motivation to learn tends to declining across the adolescent years (Gottfried et al., 2001; Hayenga & Corpus, 2010; Lepper et al., 2005). Even if teenage students find learning to be less and less inherently interesting or enjoyable over time,

teachers can still help them to feel willingly and meaningfully engaged through the use of autonomy-supportive teaching practices. Indeed, autonomy support is a critical socialization practice because, to the extent that teachers can support their students' sense of autonomy in academic environments, they socialize students to perceive deep engagement in such environments as a satisfying reflection of their interests, values, and goals (Ryan & Deci, 2017c). Conversely, to the extent that teachers support controlled motivation within their students, they socialize students to perceive engagement in that environment as a pressured behavior that is distal from the self.

Having outlined the powerful effects that teacher autonomy support (including the provision of autonomy-supportive rationales) can have on student motivation, the next section will review prior research that lends support for the primary hypothesis of this dissertation: that teachers may be less likely to offer autonomy support to, and more likely to be controlling toward, students from certain racial and social class backgrounds.

Evidence of Race and SES Bias in Teachers' Provision of Autonomy Support

Do teachers apply motivational practices, such as the provision of autonomy-supportive rationales, evenly across all racial and socioeconomic groups of students? Or are teachers less likely to offer support for autonomous motivation to Black students and students from low-SES backgrounds, as this dissertation proposes? Answering this question is important because, if teachers are in fact less likely to offer Black and low-SES students support for feeling willingly engaged in schoolwork, they may be socializing these students to perceive schooling as less meaningfully connected to the self, which could have negative consequences for their behavioral engagement in the classroom and their persistence through high school (see Gillet et al., 2012; Kao & Thompson, 2003; Vallerand

et al., 1997). A review of existing evidence of racial and socioeconomic disparities in teachers' provision of autonomy support follows.

Few studies have investigated whether Black and low-SES students may be especially likely to be deprived of autonomy support from teachers (Patall et al., 2013; Solomon et al., 1996). One reason for the dearth of research on this topic is that many SDT-based studies are conducted outside of the U.S. (e.g., in Belgium and the Netherlands; Domen et al., 2020; Mouratidis et al., 2018). These countries tend to be more ethnically homogenous (Alesina et al., 2003), making it less feasible to study ethnic bias in teacher autonomy support. Furthermore, Black-white relations in these countries (Mielants, 2007) differ enough from those in the U.S. that it cannot be assumed that racial/ethnic biases among teachers in those countries would replicate among U.S. teachers.

Though few in number, existing studies generally lend support for the hypothesis that teachers are less likely to offer autonomy support to (and more likely to be controlling toward) Black students and low-SES students. One study investigated how school-level poverty (i.e., the percentage of students eligible for subsidized lunch) was associated with teachers' observed use of autonomy-related classroom practices in a large national sample of U.S. elementary schools (Solomon et al., 1996). Importantly, in this study, the SES composition and racial composition of the schools were closely linked, such that students in higher-poverty schools tended to be majority Black, while students in lower-poverty schools tended to be majority white. The authors found that teachers in high-poverty, majority-Black schools were less likely than those in low-poverty, majority-white schools to be observed using classroom practices that support students' sense of autonomy (e.g., emphasizing the inherent interest of class activities; allowing students choice of activities). This relationship held even after controlling for potentially confounding factors, such as teachers' race/ethnicity, educational attainment, and teaching experience, and students'

classroom-level average achievement on math and reading tests. In addition, the authors found that teachers in high-poverty, majority-Black schools were more likely than those in low-poverty, majority-white schools to be observed offering students rewards and points for participation (a practice which can foster feelings of pressure), though the direction of this relationship was reversed after controlling for classroom-level achievement (Solomon et al., 1996b).

Overall, the results of the Solomon et al. (1996) study suggest that U.S. teachers are less likely to provide support through their classroom practices for Black and low-SES students to feel engaged in classwork by choice. Yet, this study does not provide a direct test of the primary hypothesis of this dissertation for two reasons. For one, it did not investigate how school racial and SES composition correlate with teachers' use of the particular practice of rationale provision. Furthermore, their study cannot support causal claims about the effect that student race and SES might have on teachers' autonomy-related practices. Still, Solomon et al. (1996) provides promising initial evidence of racial and socioeconomic biases in teachers' provision of support for students' sense of autonomous motivation in the classroom.

A few studies have investigated social group differences in being offered rationales, and they provide mixed support for the hypothesis that teachers are less likely to use this autonomy-supportive practice with Black or low-SES students (Patall et al., 2013, 2018). In a cross-sectional study, students in one urban U.S. high school rated how characteristic it was of either their English teacher or their Social Studies teacher to explain the relevance, usefulness, and importance of class activities (Patall et al., 2013). In this study, nearly 59% of the students identified as white, 19% identified as African American, and 6.8% identified as Hispanic. The authors found that, consistent with the expectations of this dissertation, non-white students tended to report weaker perceptions of teacher rationale

provision than white students did (Patall et al., 2013). However, a recent daily diary study of autonomy-supportive teaching conducted in a regional sample of U.S. high school students (32% white, 10% African American, and 42% Hispanic) found that non-white students actually tended to report stronger perceptions of rationale provision (with daily ratings aggregated across 17 days) than white students did (Patall et al., 2018) – an effect that went away after controlling for other student-, classroom-, and day-level variables (Patall et al., 2017). This discrepancy in findings between the Patall et al. (2013) and Patall et al. (2018) studies may not represent a failure to replicate so much as a difference between the study samples, as the authors partially allude to (Patall et al., 2018). Patall et al. (2018) did conceptually replicate the school-level SES-related findings of Solomon et al. (1996) by finding that students attending Title I schools reported weaker aggregate perceptions of teacher rationale provision than students in non-Title I schools did. However, contrary to expectations, the authors found that student-level SES (as measured by individual eligibility for free or reduced-price lunch) was not associated with aggregate perceptions of rationale provision (Patall et al., 2018). In sum, the state of the evidence that Black or low-SES students might be less likely to receive autonomy support from teachers via rationale provision is mixed.

Although they provide very promising initial evidence, the Patall et al. (2013; 2018) studies are also somewhat limited in their ability to speak directly to the question of whether teachers are more likely to withhold autonomy support via rationale provision from Black and low-SES students. For one, these studies were not designed to assess variation in the content of teachers' rationales. Investigating variation is important, however, because many rationales that teachers might offer students can have the effect of fostering pressured engagement in learning (Steingut et al., 2017; Vansteenkiste, Simons, Lens, et al., 2004). Since the Patall et al. (2013; 2018) studies did not differentiate the

autonomy-related content of teachers' rationales, it is not yet known which type of rationales (autonomy-supportive vs. controlling) were more commonly provided to students from different social groups. One additional way in which these two studies are limited in their ability to answer the key research question at hand is that neither of them were designed to support causal claims about the effect that student race and SES might have on teachers' provision of autonomy support through rationales. The inconsistency of the findings from these studies, and the strong possibility of confounding on the relationship between student background and teacher practice, suggests the need for a causal test of how student race and SES influence teacher rationale provision. Specifically, a study is needed that manipulates information about the race and SES of a student and then measures that manipulation's effect on the autonomy-related content of the rationales that teachers offer the student. To our knowledge, this dissertation provides the first direct causal tests of this effect.

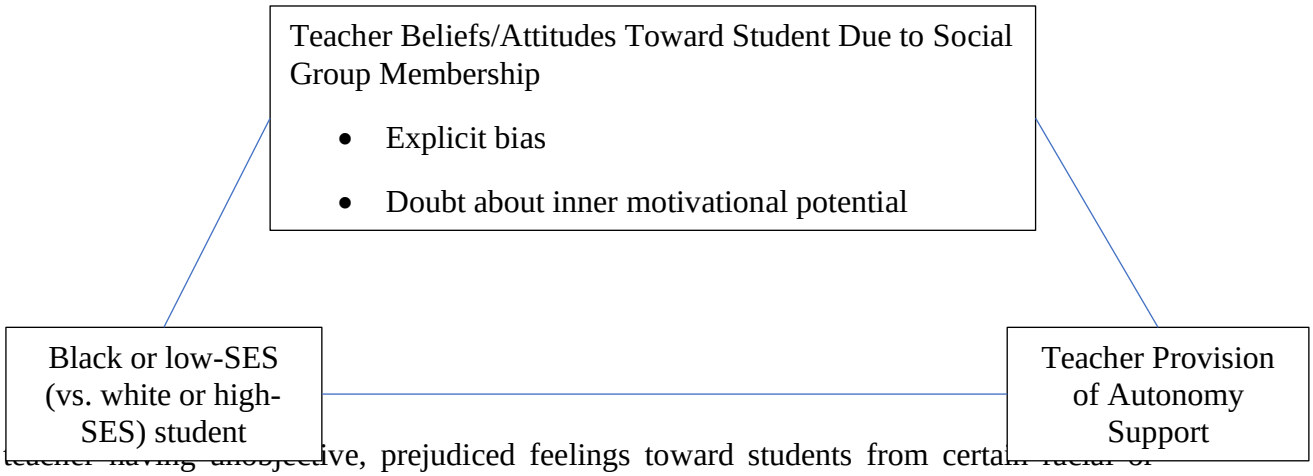
WHY RACE AND SES BIAS IN PROVISION OF AUTONOMY SUPPORT MIGHT EMERGE

In addition to investigating the causal effect of student race and SES on teachers' autonomy-related practices, the secondary aim of this dissertation is to investigate what psychological factors might mediate this causal effect. Identifying psychological mediators is important for two reasons. First, such an investigation acknowledges that student race and SES are, functionally, just external stimuli to teachers – i.e., they are aspects of teachers' environment which may or may not influence their behaviors to varying degrees. From a social-cognitive perspective, if an external stimulus has influence over human behavior, it is only to the extent that it first influences aspects of our internal (i.e., mental) world (De Houwer et al., 2013). Thus, if student race and SES information is shown to causally influence teachers' autonomy-related practices, it would then be worthwhile to

identify the psychological pathways through which this information exerts influence. A second reason to investigate causal psychological mediators is because prior research has shown that racial and socioeconomic biases in teacher practices can be effectively reduced by intervening on the beliefs and attitudes that cause teachers to behave less fairly toward students from certain social groups (Okonofua, Paunesku, et al., 2016). Thus, by identifying causal psychological mediators, this dissertation would also identify promising leverage points for eliminating racial and socioeconomic disparities in students' access to autonomy-supportive practices.

Three psychological factors (see Figure 1.1) seem likely to at least partially mediate the causal relationship between student race and SES and teacher provision of autonomy support: (1) explicit bias against Black or low-SES students, (2) negative stereotypical perceptions of the inner motivational potential of Black or low-SES students, and (3) concerns about Black or low-SES students' lower-level need satisfaction. These three factors vary considerably in the degree to which they represent a

Figure 1.1. Proposed mediational model to be tested in Study 3



teacher having unobjective, prejudiced feelings toward students from certain racial or socioeconomic backgrounds and wanting to intentionally deprive those students of

opportunities to feel like willing participants in their own education. Yet, as the next sections will discuss, all three factors have the potential to yield the same undesirable outcome of social disparity in provision of autonomy support. Furthermore, this dissertation will provide the first known explorations of this potential.

Explicit Bias

An explicit bias is an intentional and conscious feeling or attitude (whether positive or negative) that people report towards certain social groups. Measures of explicit bias can include "feeling thermometers," on which participants indicate how warmly or coldly they feel towards certain groups (e.g., Alwin, 1997), and scales that assess endorsement of prejudicial stances towards certain groups (e.g., Brigham, 1993; Henry & Sears, 2002). Generally in the U.S., people (even children; Newheiser & Olson, 2012) tend to consciously report more bias in favor of white people relative to Black people (Drakulich, 2015; Haider et al., 2011; Rae et al., 2015), though the reverse pattern tends to emerge among Black people themselves (Hehman et al., 2019). People in the U.S. also tend to consciously report more bias in favor of people from higher-SES backgrounds relative to those from lower-SES backgrounds (Cooley et al., 2019; Lott & Saxon, 2002; Shor et al., 2019; c.f. Horwitz & Dovidio, 2017).

One might hope that our nation's educators (the vast majority of whom are white and middle class; Taie & Goldring, 2017) might be more neutral in their feelings and attitudes towards different social groups, however, recent research suggests that U.S. teachers' explicit racial biases largely mirror those of the rest of the U.S. population (Starck et al., 2020). This study, conducted within a large nationally-representative sample of U.S. adults, showed that those in the teacher subsample openly reported the same degree of pro-White/anti-Black bias as adults in the non-teacher subsample did, and that this finding held

whether explicit bias was measured via feeling thermometers or via reported attitudes about the (il)legitimacy of social obstacles faced by Black people (Starck et al., 2020). One assumption that might be made based on this finding is that, if teachers are no different than other U.S. adults in their conscious social biases, then they may also be no different than others in the effect that those biases have on their behavior towards individuals from certain social groups. Assuming this is true, then it may be possible to learn how explicit racial and socioeconomic biases affect the autonomy-related behaviors of U.S. teachers by studying this relationship within the general U.S. population. Two studies in this dissertation make this assumption while testing the effect of student race and SES on U.S. adults' provision of autonomy-supportive rationales.

Prior research has already shown that teachers' explicit racial biases can affect their behaviors toward and perceptions of students from different racial backgrounds. For example, a recent study found in a national sample of U.S. teachers that racial disparities in school discipline outcomes were larger in counties where teachers reported stronger explicit pro-white/anti-Black bias (Chin et al., 2020), i.e., in areas where conscious negative feelings toward Black people relative to white people were more widely shared among teachers. Another study conducted within a U.S.-based sample of pre-service teachers found that, as explicit pro-white/anti-Black bias (measured by prejudicial attitudes about racial differences in academic behaviors) increased, teachers' likelihood of inaccurately perceiving anger on the faces of white children decreased (Halberstadt et al., 2020). This particular finding strongly suggests that having more positive attitudes about white students relative to Black students may help to make teachers more accurate judges of white students' psychological states.

Could explicit pro-white/anti-Black bias also influence teachers' responsiveness to white and Black students' psychological states (e.g., a state in which they lack a sense of

autonomy)? No known study has ever directly tested this hypothesis. Studies have shown that teachers are more likely to offer autonomy support to students that they personally like (Skinner & Belmont, 1993). Thus, if explicit pro-white/anti-Black bias represents the degree to which U.S. teachers like white students more than they like Black students, then it may be reasonable to expect that explicit pro-white/anti-Black bias would explain racial disparities in students' receipt of autonomy support. A parallel argument could be made about the potential for explicit anti-poverty bias to explain socioeconomic disparities in receipt of autonomy support. This dissertation provides the first known test of the complete mediational pathway from student race and SES to teachers' conscious feelings about students to teachers' autonomy-related behaviors.

Perceptions of Low Inner Motivational Potential

Explicit bias toward white and high-SES people (relative to Black or low-SES people) may not be necessary in order for racial and socioeconomic bias in teachers' provision of autonomy support to emerge. Instead, the effect of student race and SES on teacher autonomy support could be explained by teachers judging that Black or low-SES students have less capacity for meaningful, willing engagement in learning.

Research based in SDT has shown that teachers tend to use more controlling practices with students who they perceive to be either unmotivated, externally motivated, or low ability (Pelletier et al., 2002; Sarrazin et al., 2006) – i.e., qualities which suggest a student is unlikely to engage in learning without being incentivized or pressured. This is relevant to a discussion of racial and socioeconomic bias in autonomy support because stereotypes prominent within U.S. culture portray Black people and low-SES people as being inherently less intelligent, less hard-working, less valuing of education, and less self-controlled (Alexander et al., 1987; Chang & Demyan, 2007; Cherng, 2017; Fiske et al.,

2002; Gorski, 2008; Norman, 2016; Skiba et al., 2011) than white or high-SES people. Taken together, these harmful stereotypes could lead U.S. teachers to expect that Black or low-SES students possess fewer inner resources to support autonomous engagement in academic contexts, which in turn could lead them to use fewer autonomy-supportive practices and more controlling practices with these students. Relatedly, having doubts about Black and low-SES students' inner motivational potential could also lead teachers to doubt their own ability to keep these students engaged in learning, which could also lead to them using fewer autonomy-supportive practices with these students (Berger et al., 2018).

Some evidence that U.S. teachers do perceive Black and low-SES students as less capable of autonomous engagement in learning comes from Solomon et al. (1996), which found that teachers reported more skepticism about students' academic potential and motivation, as well as weaker beliefs that students learn best when allowed to self-direct their learning, as school-level poverty increased (and with it, the proportion of Black students within a school). Furthermore, as previously mentioned, teachers in those higher-poverty, majority-Black schools were less likely to be observed using autonomy-supportive practices in the classroom (Solomon et al., 1996). Thus, it seems that negative stereotypic beliefs about Black and low-SES students' academic ability, motivation, and self-direction do exert influence on their teachers' willingness to support these students' sense of autonomy in the classroom.

The nature and persistence of negative stereotypes about Black and low-SES people point to issues regarding the dehumanization of these groups. Dehumanization is the perception that certain groups are less human than others, especially relative to one's in-group (Haslam & Loughnan, 2014). Dehumanization can be blatant, where people perceive certain groups as more animal-like and therefore less evolved (e.g., Kteily et al., 2015).

Dehumanization can also be subtle, where people attribute to certain groups fewer sentiments (e.g., hope and remorse; Demoulin et al., 2004) and traits (e.g., ambitious and analytic; Haslam et al., 2005) that are unique to humans. It has been well-documented that, in Western cultures, people dehumanize Black people (even Black children; Goff et al., 2014) and high-poverty groups in both blatant and subtle ways (Costello & Hodson, 2014; Goff et al., 2008; Loughnan et al., 2014; Sainz et al., 2019). Most relevant to the present dissertation, a recent online study conducted in a sample of U.S. adults found that adults tend to subtly dehumanize high-poverty groups by attributing to them fewer uniquely human needs (Schroeder & Epley, 2020). Specifically, this study found that adults discounted how important it is for people experiencing homelessness to be able to meet their purely psychological needs, including the need to be able to make choices freely – and they did so to the same degree that they discounted these needs among non-human primates (Schroeder & Epley, 2020).

Dehumanizing beliefs about Black and low-SES people can have serious consequences for people's treatment of these groups, including making people more likely to endorse limiting their independence (Sainz et al., 2019, 2020), to use violence against them (Goff et al., 2014; see Owusu-Bempah, 2017), and to sanction their death (Goff et al., 2008). To the extent that teachers hold dehumanizing stereotypical beliefs about the qualities and capabilities of Black and low-SES students, they may be more likely to intentionally deprive these students support for a sense that their behavior in the classroom is freely chosen, and instead opt to use practices that will coerce them into behaving in teacher-desired ways (Bruneau et al., 2020). This dissertation will be the first to test the mediational pathway from student race and SES to teachers' stereotypic perceptions of students' capacity for and valuing of self-determination to teachers' autonomy-related practices.

Investigating whether teachers' stereotypic perceptions causally mediate their response to a Black or low-SES student may be especially important in scenarios where the student is situationally amotivated to learn – a state that is undesirable for teachers (Bridgeland et al., 2013). A recent study of race disparities in school discipline found that the degree to which teachers exhibit controlling responses to undesirable student behavior depends on the degree to which the behavior is consistent with stereotypes about the student's social group (Okonofua & Eberhardt, 2015). Specifically, the study found that teachers judged a student who was misbehaving in class as more deserving of a severe disciplinary response if the student was Black (and thus, behaving in ways consistent with a group stereotype of unruliness) than if the student was white. This effect was mediated by teachers having stronger beliefs that misbehavior by the Black student was likely to be indicative of a concerning pattern (Okonofua & Eberhardt, 2015). This study suggests that, since Black and low-SES students are stereotyped as academically unmotivated, teachers might be especially likely to use controlling practices to motivate a situationally amotivated student if the student is Black or low-SES (and thus, behaving in stereotype-consistent ways). This dissertation investigates the effect of student race and SES on teachers' autonomy-related practices in the context of motivating a student who is situationally unmotivated, and it tests whether this effect is mediated by stronger perceptions that this behavior is more indicative of a pattern if the student is Black and low-SES.

Concerns about Fulfillment of Lower-Level Needs

A third and final promising mediator of the effect of student race and SES on teacher provision of autonomy support is concern with helping students meet their lower-level needs. I argue that teachers do not need to be intentionally biased against Black and low-SES students, nor do they need to think less of their inner motivational potential, in

order to show racial and socioeconomic bias in their use of autonomy-supportive practices. Instead, bias toward using more controlling practices with Black or low-SES students could emerge as a result of placing too much emphasis on helping these students' meet their lower-level human needs at the expense of their higher-level ones.

A brief overview of what is meant by "lower-level" and "higher-level" human needs follows. This language is drawn from Abraham Maslow's theory of motivation, which argues that humans have several categories of consciously-felt basic needs that can be arranged in a fixed hierarchy based on their primacy and power as motivators of human behavior (Maslow, 1943, 1948). These needs, in descending order of prepotency, include: physiological needs (e.g., food, water, clothing, sleep), safety needs (e.g., shelter, health, financial security, predictability), love needs (e.g., affection, belonging, intimacy), esteem needs (achievement, confidence, personal freedom, self-worth, respect from others), and finally the need for self-actualization (i.e., "to become everything that is capable of becoming", Maslow, 1943, p. 382). One crucial yet underappreciated point that Maslow made when introducing his theory is that autonomy ("freedom to speak, freedom to do what one wishes…freedom to express oneself, freedom to investigate and seek information"; Maslow, 1943, p. 383) is a vital precondition for the satisfaction of all five basic needs. In other words, whether striving to satisfy lower-level physiological and safety needs or high-level needs for esteem and self-actualization, individuals desire to feel as if their behaviors are self-determined and experience threats to self-determination as threats to satisfaction of their basic needs. This proposition is consistent with SDT's view that the need for a sense of autonomy is innate in humans and present across the lifespan (Ryan & Deci, 2000, 2017c).

Maslow's theory of a hierarchy of human needs is widely popular in the U.S. cultural context (often depicted as a pyramid, an oversimplificaton; Kaufman, 2021;

Mcleod, 2020), though it is important to note that, unlike SDT, it has not been subjected to much rigorous empirical testing. What investigations do exist provide some support for the prepotency of his proposed needs (e.g., Noltemeyer et al., 2012; Tay & Diener, 2011; c.f. Belson et al., 2018). For example, a large international study of need satisfaction found that people do generally strive to satisfy their physiological and safety needs first, and that esteem needs (e.g., respect and mastery) tend to emerge last (Tay & Diener, 2011). However, contrary to Maslow's theorizing, this study also found that the need for autonomy (here, freedom and choice) emerged prior to other esteem needs and it was not uncommon for individuals with above average need fulfillment to have their higher-level needs fulfilled before their need for safety. Together, the theory and these surprising findings suggest that satisfaction of safety needs is not wholly required for the satisfaction of higher-level needs (a point which will become relevant shortly), but a sense of autonomy is critical at all levels.

Teachers do tend to be very concerned about whether their students' lower-level needs are being met outside of school, in large part because going without the satisfaction of physiological and safety needs can be detrimental to students' academic abilities and achievement (e.g., Noltemeyer et al., 2012). It is not uncommon for teachers to express the sentiment that, if a student doesn't have their most low-level needs met at home, then they feel relatively powerless to be able to help that student learn and engage meaningfully in school (Baum & McMurray-Schwarz, 2004; Patterson et al., 2016), suggesting their implicit endorsement of Maslow's proposed hierarchy of needs. Yet, teachers' concerns about their students' ability to meet lower-level needs are not evenly distributed between social groups. Persistent and deeply-embedded social inequalities in access to and control over wealth within U.S. society make it such that Black children and low-SES children are more likely than white and high-SES children to be deprived of satisfaction of

physiological and safety needs (Forum on Child and Family Statistics, 2018).Thus, teachers' concerns about lower-level need satisfaction are highly stratified by student race and SES. What consequences might this stratification of concerns have on teachers' willingness to provide autonomy support to students from different racial and socioeconomic backgrounds? The present dissertation proposes that it could lead to teachers making the well-intentioned yet motivationally harmful decision to use more controlling practices and fewer autonomy-supportive practices with Black and low-SES students.

No known study has ever tested the hypothesis that teachers' concerns about Black and low-SES students' lower-level need satisfaction might decrease their likelihood of providing autonomy support to these students. However, related research suggests that it may be well-justified. When teachers perceive that a student may lack safety and predictability to some degree at home, they may think it all the more important to provide that student a safe and predictable place to learn, i.e., to make the classroom learning environment more structured. Teacher practices that help to create a more structured classroom environment include providing clear expectations of behavior and clear instructions for engaging in class activities (Reeve, 2006; Vansteenkiste et al., 2012). Research has shown that students evidence the greatest feelings of autonomous motivation and most adaptive learning outcomes occur in learning environments characterized by both autonomy support and structure (Hospel & Galand, 2016; Jang et al., 2010; Vansteenkiste et al., 2012; c.f. Mouratidis et al., 2018) and that the two constructs represent distinct aspects of classroom environment. Yet, teachers may believe that creating structure for students requires the use of controlling practices or that autonomy-supportive practices undermine a structured learning environment – views which may be especially likely if a teacher has reasons to be concerned about student misbehavior (see Reeve, 2009). Such

beliefs would be misconceptions, as classroom observation studies have shown that more structured learning environments diminish the need for controlling practices and empower teachers to offer their students more choice (Jang et al., 2010; Sierens et al., 2009). Yet, due to misconceptions about how structure relates to autonomy support and control, teachers could be more inclined to use controlling practices with students whose safety need satisfaction they have more cause to be concerned about (i.e., Black or low-SES students), thus unintentionally thwarting these students' ability to feel freely engaged in learning. Conversely, teachers could be more likely to use autonomy-supportive practices with students whose safety needs are more likely to be well met at home (i.e., white or high-SES students).

Related to concerns about safety in the form of predictability, racial and socioeconomic bias in teacher autonomy support might also result from teachers' greater concerns about the financial safety of their Black and low-SES students relative to white and high-SES students. To the extent that teachers are aware of racial and socioeconomic gaps in wealth, they may be very worried about their Black and low-SES students' chances of having a financially secure future. Out of this concern, teachers may judge that it is best to motivate these students with messages about how engaging in classwork can help them to ensure their and their family's financial security in the future. The problem is that U.S. teachers (who are primarily middle class; Taie & Goldring, 2017) may not have a nuanced understanding of how to frame financial success goals and relational goals in ways likely to be autonomy supportive for low-SES students (e.g., promoting closeness with others; Gore & Cross, 2006; Stephens et al., 2011), and may instead be more likely use controlling variants of these rationales (e.g., to avoid disappointing others). It is important to note here that many Black and low-SES students do have well-internalized goals to be able to do well in school so they can make more money and help their family (e.g., Phinney et al.,

2006). However, by regularly reminding these students of their financial insecurity and their family's reliance on them for help, teachers may cause them to feel embarrassment and a strong sense of pressure to engage – feelings which can actually undermine the quality of their learning and engagement (Litalien et al., 2017; Vansteenkiste et al., 2012; Witkow et al., 2015). More importantly, by placing emphasis on how learning activities relate to these students' ability to acquire external resources in the future, teachers would be neglecting to connect the learning material to the plethora of inner motivational resources that Black and low-SES students already possess (e.g., their interest, values, meaningful goals). If such resources were properly leveraged, they would spur more meaningful engagement in learning and might better fulfill teachers' goal of facilitating Black and low-SES students' path toward financial security.

OVERVIEW OF STUDIES

This dissertation will investigate two primary research questions related to the nature and causes of racial and socioeconomic bias in teachers' provision of autonomy support via the motivational practice of rationale provision.

Research Question 1, investigated across two studies, will ask whether U.S. teachers are less likely to offer autonomy-supportive rationales to Black students and low-SES students than they are to white students and high-SES students. Study 1 – a randomized experiment conducted in a national sample of U.S. adults – will test whether participants who read about a situationally amotivated student are less likely to choose to offer them an autonomy-supportive rationale (and more likely to offer a controlling rationale) if the student is characterized as Black and low-SES as opposed to white and high-SES. Study 2 will use data from a national survey of U.S. high school math teachers to test whether teachers who serve a greater proportion of Black students or a greater

proportion of low-SES students are less likely to self-generate autonomy-supportive rationales after reading about a situationally amotivated student.

Research Question 2, investigated in one final study, will seek to identify causal psychological mediators of the effect that student race and SES have on teacher autonomy support. Study 3 will seek to conceptually replicate the causal test performed in Study 1 within a new national sample of U.S. adults, and it will extend Study 1 by a) disentangling the unique effects that student race and student SES have on teacher autonomy support and b) exploring three promising psychological factors that might explain this causal effect: explicit bias, perception of low motivational potential, and concerns about lower-level need fulfillment.

Chapter 2: The Effect of Student Race and Social Class on Adults' Provision of Autonomy-Supportive Rationales

One powerful practice that teachers can use to enhance the quality of their students' motivation and engagement is to offer them autonomy-supportive rationales for engaging in learning (Patall et al., 2018; Steingut et al., 2017). But are teachers inclined to use this practice equitably with all of their students, regardless of racial and socioeconomic background? The present study uses a randomized experiment to answer this question and test the hypothesis that U.S. teachers are less likely to offer autonomy-supportive rationales to Black and low-socioeconomic status (SES) students than they are to offer them to white and high-SES students.

No previous study has directly tested whether student race and SES have causal effects on U.S. teachers' likelihood of using autonomy-supportive rationales to motivate students. Preliminary research conducted by Solomon et al. (1996) showed, in a national sample, that teachers in higher poverty, majority-Black U.S. elementary schools were less likely than teachers in lower poverty, majority-white elementary schools to be observed using autonomy-supportive practices in the classroom. These results held even after controlling for potentially confounding factors, such as duration of teaching experience and class-level student achievement, providing somewhat robust initial evidence in support of the present study's main hypothesis.

Yet, in several ways, the Solomon et al. (1996) study is limited in its ability to address the present research question. First, Solomon et al. (1996) did not specifically investigate rationales, instead examining other autonomy-supportive practices (e.g., providing choice of activities). Second, their study focused on school-level demographic composition, not student-level demographics, and also used a correlational design. This leaves open the possibility that the relationship between student race and SES and teacher

autonomy support was confounded by unobserved factors known to be associated with both school-level demographics and teachers' use of autonomy-supportive practices (e.g., accountability pressures; Flink et al., 1990; Nichols et al., 2006). In order to identify the causal effect of student race and SES on U.S. teachers' provision of autonomy-supportive rationales, we need a study that experimentally manipulates the race and SES of a target student prior to measuring U.S. teachers' use of this particular practice. The present study addresses this need.

THE PRESENT STUDY

Specifically, the present study uses a vignette-based experimental design, in which a nationally-representative sample of U.S. adults first read about a hypothetical, amotivated student who is seeking a rationale for engaging in learning, and then indicate what type of rationale (autonomy-supportive vs. controlling) they would be most likely to offer this student in order to motivate them to engage. The race and SES of the hypothetical student are jointly manipulated between two separate vignettes, in order to assess whether adults might be differently inclined to offer autonomy-supportive rationales to the hypothetical student if they are described as Black and low-SES as opposed to white and high-SES.

Conducting the first test of this hypothesis in a sample of U.S. adults using a vignette design is appropriate for several reasons. First, by conducting the study in a sample of U.S. adults, we are able to learn about what socially-biased motivational tendencies currently exist in the U.S. population at large, knowing that U.S. teachers tend to show the same social biases as the U.S. general public (Starck et al., 2020). Teachers, like non-teachers, have been socialized into U.S. culture, along with the subtle and not-so-subtle biases that entails. Thus, if the hypothesized effect of student race and SES on provision of autonomy-supportive rationales is found in this sample of U.S. adults, then that would

suggest that the effect is also likely to exist among U.S. teachers. Second, the vignette design is appropriate for a causal test of this study's main hypothesis because it allows us to carefully control what information participants have about the target student and ensure that the only factor that differs between the two experimental conditions is the description of the target student's racial and socioeconomic background. Such controls would not be possible if we tried to investigate how teachers' provision of autonomy-supportive rationales varies with their real-world students' race and SES – characteristics which cannot be experimentally manipulated and are likely to be confounded with other factors. Finally, the vignette design is very fitting for a study aimed at measuring variation in rationale content because, in the real world, the base rates at which teachers offer their students rationales for engaging in learning are either inconsistent or low (Schmidt et al., 2019; Wallace & Sung, 2017). During their naturalistic interactions with students, teachers may or may not ever find themselves being clearly prompted to provide rationales, which would make it very difficult and inefficient to investigate variation in the autonomy-related content of teachers' rationales using a naturalistic experiment. However, using a vignette-based experiment, we can equally expose all participants to a hypothetical student who is clearly in need of a rationale and easily capture variation in the type of rationales that they provide (autonomy-supportive vs. controlling).

The findings of this study stand to make a few meaningful contributions. Most students at some point will need help from their teachers with feeling freely engaged in their own education. This investigation of social inequality in teachers' provision of autonomy-supportive rationales can help to uncover which groups of students are more likely to go without such help. Furthermore, if the findings from this study support the main hypothesis, they would add to a growing body of evidence which shows that U.S. teachers are biased towards viewing student behaviors as more deserving of a controlling

response if enacted by Black students rather than by white students (Okonofua & Eberhardt, 2015; Skiba et al., 2011).

METHOD

Participants

Data were collected from a nationally representative sample of U.S. adults in the spring of 2013 through Time-Sharing Experiments for Social Scientists (TESS), an NSF-funded program that gives social science researchers opportunities to run survey-based experiments in national probability samples of the U.S. general population. A random probability-based sample of N = 3316 adults were selected from an online panel of U.S.-based respondents maintained by the survey research firm GfK Custom Research (then called Knowledge Networks). From there, n = 2071 adults (62.5% of those to whom the study was fielded) were able to be contacted, were eligible to participate, and agreed to complete the study. In the end, n = 2026 participants (97.8% of those who completed the study) had a survey duration of more than one minute; it was these individuals who GfK considered to be qualified participants and who comprised the analytic sample for this study. Table 2.1 displays descriptive statistics on the demographic characteristics of the analytic sample.

Procedures

In this within-subjects experiment, participants were presented with two vignettes about amotivated students. The sociodemographic characteristics of the student were varied across the two vignettes and the order of presentation was manipulated between subjects. Therefore, the study could provide a between-subjects analysis of differences by

Table 2.1. Weighted Sociodemographic Characteristics of Sample

Demographic Characteristics	Percentages
Gender	
Female	52%
Male	48%
Race/Ethnicity	
Black, non-Hispanic	12%
white, non-Hispanic	67%
Other races/ethnicities, non-Hispanic	7%
Hispanic	15%
Age[a]	
18 – 24 years old	10%
25 – 34 years old	19%
35 – 44 years old	18%
45 – 54 years old	16%
55 – 64 years old	20%
65 – 74 years old	12%
75 years old and up	5%
Highest Education Level	
No high school diploma	13%
High school diploma/GED	29%
Some college/Associate's degree	29%
Bachelor's degree or higher	29%
Household Income	
$0 - $30,000	24%
$30,000 - $59,999	27%
$60,000 - $84,999	16%
$85,000 - $124,999	19%
$125,000 or more	14%
Political Orientation[b]	
Extremely liberal	4%
Liberal	14%
Somewhat Liberal	10%
Moderate	38%
Somewhat conservative	13%
Conservative	18%
Extremely conservative	4%
Metro Area Status	
Metro	16%
Non-metro	84%
Region	
Northeast	18%
Midwest	22%
South	37%
West	23%

Note: N = 2026. Values may not add up to 100% due to rounding. [a] Participants were, on average, M = 46.90 years old (SD = 16.89). [b]The mean value of political orientation was M = 4.11 (SD = 1.47).[a]

condition in participants' responses to the first vignette (the primary analysis), as well as an exploratory within-subjects analysis of differences in response to the first and second vignettes, holding participant constant (the secondary analysis). This within-subjects design also allowed for an analysis of the effect of the order in which each vignette was presented.

At the start of the study, participants were told that they would read a brief story about a student. They were then asked to imagine that they were this student's teacher and to indicate what they would be most likely to do in the situation presented in the story. The vignette they read is presented below:

"Imagine a student from [SOCIO-DEMOGRAPHIC GROUP]. You hear the student say "I don't want to do this assignment any more. I don't see the point. I'm giving up." Imagine you were this student's teacher and wanted to motivate the student. Now please read each statement below. Then select the statement that best describes what you would be MOST likely to do."

In the low-SES-and-Black condition, the text in the brackets was manipulated to be "a poor family who attends a public high school located in the inner-city." In the high-SES-and-white condition, the text was "a moderately wealthy family who attends a public high school located in a suburban neighborhood."

The phrase "inner-city" in the vignette for the low-SES-and-Black condition is a widely-recognized cue (Albertson, 2015) meant to implicitly communicate to participants that the hypothetical student was Black, while the use of the phrase "suburban" in the vignette for the high-SES-and-white condition was meant to communicate that the student was white (Penner & Saperstein, 2013). We avoided mentioning race explicitly in this study in order to follow the convention used in other vignette studies (Bertrand & Mullainathan, 2004; Braddock II et al., 1986), and also because of our assumption that

respondents would be less comfortable answering honestly if they were more conscious of the fact that the study was intended to assess differences in their responding as function of student race in addition to student SES.

After participants read each short vignette, they were asked to select which of the four statements presented below – representing four distinct rationales for doing the assignment: two autonomy-supportive and two controlling – best described what they would be most likely to do to motivate the hypothetical student :

- Mention that they need to do the work if they want to earn a lot of money in a good job one day [LucrativeJob; *Controlling*].
- Mention that their family is counting on them to do the work, graduate and go to college [FamilyRely; *Controlling*].
- Mention how the assignment could be related to their personal interests, like sports or music [PersonalInterest; *Autonomy-supportive*].
- Mention that if they really learn from the assignment, they may be able to help people by using that knowledge one day [HelpOthers; *Autonomy-supportive*].

These statements were presented in a random order that was counterbalanced across participants. After participants had selected their first-choice rationale, the survey proceeded to the next page, where the three rationales that they had not yet selected were displayed, preceded by this prompt: "Of the remaining statements listed below, select the statement that describes what you would be MOST LIKELY to do" to motivate the student. Participants then selected their second-choice rationale, and the survey proceeded to the final page, where they were asked to indicate which of the last two remaining statements "best describes what they would be MORE LIKELY to do" to motivate the student. In this way, participants provided a forced-choice ranking of the four rationales that they could offer the student in the first vignette. After this was done, participants were shown the

second vignette, about the student from the other sociodemographic group, and were asked to rank the four rationales in the same way that they did for the first vignette.

Measures

Choice of Autonomy-Supportive Rationales

The primary outcome of this study was a dichotomous variable indicating whether participants had selected one of the autonomy-supportive rationales as their first choice for motivating the student they read about in a given vignette (1 = Autonomy-supportive, 0 = Controlling). The controlling rationales were represented by the statements labeled LucrativeJob and FamilyRely (see text above), and the autonomy-supportive rationales were represented by the statements labeled PersonalInterest and HelpOthers.

A supplementary analysis required the creation of a dichotomous variable indicating whether participants had selected either of the autonomy-supportive rationales as one of their top-two choices for motivating the student from the first vignette (1 = Autonomy-supportive as first or second choice, 0 = Controlling as first and second choice). Lastly, additional supplementary analyses required the creation of a four-level categorical variable indicating which of the four rationales participants selected as their first choice for motivating the student from the first vignette (1 = HelpOthers, 2 = PersonalInterest, 3 = LucrativeJob, 4 = FamilyRely.

Participant Demographics

We obtained demographic characteristics of participants from the GfK panel member profile survey. They were: gender, age, race/ethnicity, education, income, metropolitan area, and political ideology (i.e. liberal or conservative).

RESULTS

Preliminary Analyses

Condition Balance Testing

Table 2.2 displays statistics from balance tests that were performed to assess the performance of the random assignment mechanism. Results indicated that participants in the low-SES-and-Black condition did not differ significantly from those in the high-SES-and-white condition on any of the measured demographics. Thus, this study was poised to test for the causal effect of the sociodemographic background manipulation.

Non-Response Balance Testing

A total of n = 13 participants had missing data on the first-choice autonomy-supportive rationale provision measure. Crucially, participants who did not respond to this measure were no more likely to be in either experimental condition than were participants who did respond, p = .72. Balance tests (Table 2.3) indicated that non-responders were significantly younger (Mage = 39) than participants who did respond (Mage = 47), p = .04. Additionally, non-responders were significantly less well-educated than responders, p = .04, and also had significantly less household income than responders, p = .01. However, since missingness on this outcome variable did not seem to affect condition balance, we proceeded with our primary analysis.

Primary Analysis: Autonomy-Supportive Rationale as a First-Choice

Across conditions, 78% of participants selected one of the two autonomy-supportive rationales as their first choice for motivating the amotivated student in the first vignette. A Pearson's chi-square test of independence with Rao-Scott second-order correction (Rao & Scott, 1981) indicated that, as expected, participants' likelihood of

Table 2.2. Weighted Balance Achieved on Sociodemographic Covariates

	First Condition		*p*-value	Standardized Mean Difference
	High SES and white	Low SES and Black		
N	977	1049		
Gender (%)			.97[a]	.002
Female	51.8	51.7		
Male	48.2	48.3		
Race/Ethnicity (%)			1.00[a]	.01[c]
Black, non-Hispanic	11.5	11.7		
white, non-Hispanic	66.5	66.6		
Other, non-Hispanic	7.4	7.1		
Hispanic	14.5	14.6		
Age (*M* (*SD*))	47.03 (16.97)	46.77 (16.82)	.78[b]	.02
Highest Education Level (%)			1.00[a]	.01[c]
No high school diploma	12.5	12.8		
High school diploma/GED	29.4	29.5		
Some college/Associate's degree	28.8	28.7		
Bachelor's degree or higher	29.3	29.0		
Household Income (%)			.94[a]	.05[c]
$0 - $30,000	24.4	23.4		
$30,000 - $59,999	26.0	27.7		
$60,000 - $84,999	16.8	15.6		
$85,000 - $124,999	19.1	19.3		
$125,000 or more	13.7	13.9		
Political Orientation (%)			.37[a]	.14[c]
Extremely liberal	4.3	3.7		
Liberal	14.7	12.4		
Somewhat Liberal	9.9	10.2		
Moderate	36.9	39.6		
Somewhat conservative	11.5	13.7		
Conservative	19.5	16.1		
Extremely conservative	3.2	4.4		
Metro Area Status (%)			1.00[b]	.00
Metro	84.2	84.0		
Non-metro	12.8	16.0		
Region (%)			1.00[a]	.01[c]
Northeast	17.9	18.1		
Midwest	21.5	21.6		
South	37.2	37.4		
West	23.3	22.9		

Note: $N = 2026$. [a] *p*-value obtained from Pearson's chi-square test with Rao-Scott second-order correction. [b] *p*-value obtained from one-sample t-test that assumes equal variances between groups. [c] Value represents the average of all possible standardized mean differences between categories.

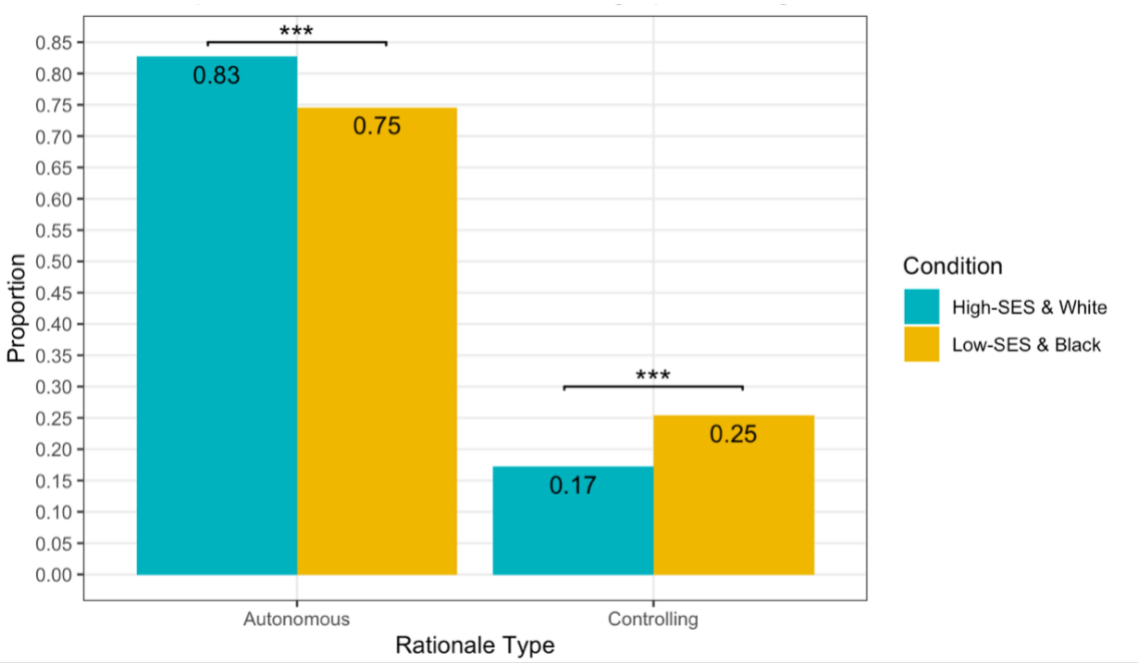
Table 2.3. Weighted Balance Tests of Missingness on Rationale Provision Measure

	Missingness Status		*p*-value	Standardized Mean Difference
	Missing	Non-Missing		
N	19.4	2006.6		
Gender (%)			.90[a]	.04
Female	49.6	51.8		
Male	50.4	48.2		
Race/Ethnicity (%)			.31[a]	.60[c]
Black, non-Hispanic	25.2	11.5		
white, non-Hispanic	44.1	66.8		
Other, non-Hispanic	19.8	7.2		
Hispanic	10.9	14.6		
Age (*M* (*SD*))	39 (13)	47 (17)	.04[b]	.53
Highest Education Level (%)			.04[a]	.92[c]
No high school diploma	40.7	12.4		
High school diploma/GED	33.4	29.4		
Some college/Associate's degree	4.2	29.0		
Bachelor's degree or higher	21.7	29.2		
Household Income (%)			.01[a]	1.02[c]
$0 - $30,000	9.4	24.0		
$30,000 - $59,999	68.8	26.5		
$60,000 - $84,999	3.6	16.3		
$85,000 - $124,999	15.3	19.3		
$125,000 or more	2.8	13.9		
Political Orientation (%)			.45[a]	.88[c]
Extremely liberal	0.0	4.0		
Liberal	0.0	13.6		
Somewhat Liberal	2.9	10.1		
Moderate	51.7	38.2		
Somewhat conservative	5.3	12.7		
Conservative	32.6	17.6		
Extremely conservative	7.5	3.8		
Metro Area Status (%)			.95[b]	.02
Metro	84.8	84.0		
Non-metro	15.2	16.0		
Region (%)			.59[a]	.46[c]
Northeast	21.0	18.0		
Midwest	15.3	21.7		
South	22.7	37.4		
West	41.0	22.9		
First Condition (%)				
High-SES-and-white	41.8	48.3	.72[a]	.13
Low-SES-and-Black	58.2	51.7		

selecting an autonomy-supportive rationale differed significantly between levels of the sociodemographic background manipulation, X^2(1, 2012) = 23.69, p < .001, Cohen's h = .22.

While 82% of participants who first read the vignette about the disengaged high-SES and white student were inclined to select one of the autonomy-supportive rationales as the best option for motivating the student, only 73% of students who first read about the disengaged low-SES and Black student did so (see Figure 2.1). Necessarily then, these results also indicated that while only 18% participants who read about the disengaged high-SES and white student selected one of the controlling rationales as the best option for motivating the student, 27% of participants who read about the disengaged low-SES and Black student did so.

Figure 2.1. Effect of sociodemographic condition on probability of selecting rationale type as first choice for motivating the student in the first vignette



The results of this analysis show that the majority of U.S. adults are aware that autonomy-supportive rationale provision would be their best bet as a teacher for motivating an amotivated student. Yet, these results also provide support for our hypothesis that U.S. adults are less likely to make use of this practice if the amotivated student is Black and low-SES as compared to white and high-SES.

Supplementary Analyses

Autonomy-Supportive Rationale as One of the Top Two Choices

Exploratory analyses were conducted to investigate the effect of the student sociodemographic background manipulation on participants' likelihood of selecting one of the autonomy-supportive rationales as either their first or second choice for motivating the amotivated student in the first vignette. The results of this analysis could help to indicate the *degree* of U.S. adults' reluctance to offer autonomy support to Black and low-SES students relative to white and high-SES students.

Across conditions, 91% of participants selected one of the two autonomy-supportive rationales as either their first or second choice for motivating the amotivated student. A Pearson's chi-square test of independence with Rao-Scott second-order correction indicated that, as expected, participants' likelihood of selecting an autonomy-supportive rationale differed significantly between levels of the sociodemographic background manipulation, $X^2(1, 2012) = 14.14$, $p = .004$, Cohen's $h = .17$.

While 94% of participants who read the vignette about the disengaged high-SES and white student were inclined to select one of the autonomy-supportive rationales as either their first or second choice for motivating the student, only 89% of students who read about the disengaged low-SES and Black student did so.

The results of this analysis again show that most – indeed, nearly all – U.S. adults understand intuitively that autonomy-supportive rationale provision would be their best bet as a teacher for motivating an amotivated student. However, these results also show that U.S. adults are more likely to forgo the use of this practice as either a first or second choice if the student in need of motivational support is low-SES and Black.

Separate Analysis of Each of the Four Rationales

Exploratory analyses were also conducted to investigate the strength and direction of the effect that student sociodemographic background had on participants' likelihood of selecting each individual rationale as a first-choice or top-two choice in response to the first vignette. The purpose of this analysis was two-fold. First, we wanted to see whether the direction of the effect was similar between the two rationales with autonomy-supportive content and, separately, between the two rationales with controlling content. Such a finding would indicate that we were justified in combining each set of rationales to create our autonomy-supportive rationale and controlling rationale composite variables, respectively.

The second purpose of this analysis was to investigate which individual rationales elicited stronger condition differences. Within each set of rationales (i.e., autonomy-supportive and controlling), one rationale emphasized how completing the assignment might promote the student's individualism and independence (PersonalInterest and LucrativeJob, respectively), while the other emphasized how completing the assignment might promote prosociality and interdependence (HelpOthers and FamilyRely, respectively) (Chirkov et al., 2003; Gore & Cross, 2006). Informed by past research on how race and SES relate to self-construals (Constantine et al., 2003; Kraus & Stephens, 2012), we hypothesized that U.S. adults would be more likely to motivate white and high-SES students with messages about independence, and more likely to motivate Black and

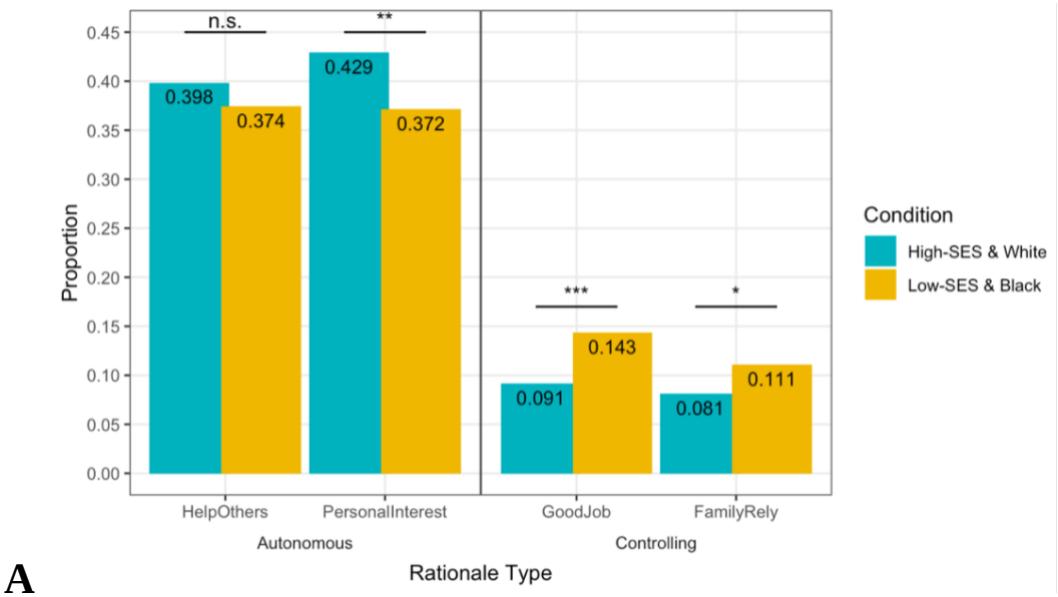
low-SES students with messages about interdependence (especially those that foster a sense of relational control).

As a first choice. First, we explored the causal effect of the sociodemographic background manipulation on participants' likelihood of selecting each individual rationale as their first choice for motivating the student in the first vignette. Across conditions, nearly 40% of participants selected the HelpOthers rationale as their first choice, 38% of participants selected the PersonalInterest rationale, 13% selected the LucrativeJob rationale, and 10% selected the FamilyRely rationale. A Pearson's chi-square test of independence with Rao-Scott second-order correction indicated that participants' likelihood of selecting a rationale as their first choice differed significantly between levels of the sociodemographic background manipulation, $X^2(3, 2010) = 25.92$, $p = .001$.

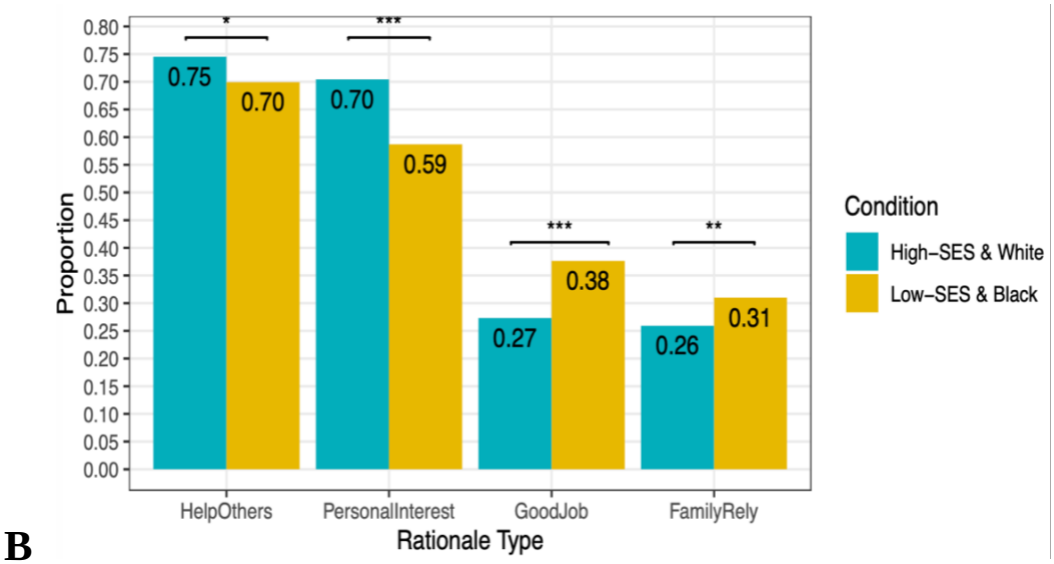
Panel A of Figure 2.2 depicts the probability that each rationale was selected as a first choice. Participants did not differ significantly between conditions in their likelihood of selecting the HelpOthers rationale. Participants did however differ significantly between conditions in their likelihood of selecting the PersonalInterest rationale; while 42% of participants in the high-SES and white condition selected this rationale as their first choice, only 35% of those in the low-SES and Black condition did, $X^2(1, 2012) = 10.89$, $p < .001$, Cohen's $h = .15$.

Significant condition differences emerged on each of the two controlling rationales, with the effect going in the opposite direction, as expected. While only 10% of participants in the high-SES and white condition selected the LucrativeJob rationale as their first choice for motivating the amotivated student, nearly 16% of those in the low-SES and Black condition did, $X^2(1, 2012) = 13.41$, $p < .001$, Cohen's $h = .17$. Lastly,

Figure 2.2. Effect of sociodemographic condition on probability of selecting each rationale as a first choice for motivating the student in the first vignette rationale selection



A



B

Note. *Panel A. Selection as Top Choice:* Effect of first condition on probability of selecting rationale as first choice for motivating the amotivated student. *Panel B. Selection as Top-Two Choice:* Effect of first condition on probability of selecting rationale as first or second choice for motivating the amotivated student.

while 8% of participants in the high-SES and white condition selected the FamilyRely rationale as their first choice, 11% of participants in the low-SES and Black condition did, $X^2(1, 2012) = 6.50$, $p = .01$, Cohen's $h = .12$.

As the first or second choice. Next, we explored the effect of the manipulation on participants' likelihood of selecting each rationale as either their first or second choice, and we found a very similar pattern of results. Across conditions, 72% of participants selected the HelpOthers rationale as one of their top-two choices for motivating the amotivated student, 64% selected the PersonalInterest rationale for this purpose, 33% selected the LucrativeJob rationale, and 29% selected the FamilyRely rationale. As before, chi-square tests indicated that participants' likelihood of selecting each rationale as one of their top-two choices differed significantly between conditions.

Panel B of Figure 2.2 depicts the probability that each rationale was selected as a first choice within each condition. This time, significant condition differences emerged in the expected direction on both autonomy-supportive rationales. While 75% of participants in the high-SES and white condition selected the HelpOthers rationale as one of their top-two choices, 70% of those in the low-SES-and-Back condition did, $X^2(1, 2012) = 5.08$, $p = .02$, Cohen's $h = .10$. Also, while 70% of participants in the high-SES and white condition selected the PersonalInterest rationale as a top-two choice, only 59% of participants in the low-SES and Black condition did, $X^2(1, 2012) = 29.83$, $p < .001$, Cohen's $h = .25$.

Significant condition differences also emerged in the expected opposite direction on each of the controlling rationales. While only 27% of participants in the high-SES and white condition selected the LucrativeJob rationale as one of their top-two choices for motivating the amotivated student, 37% of those in the low-SES and Black condition did, $X^2(1, 2012) = 24.03$, $p < .001$, Cohen's $h = .22$. Lastly, while 26% of participants in the high-SES and white condition selected the FamilyRely rationale as their first choice, 31%

of participants in the low-SES and Black condition did, $X^2(1, 2012) = 6.21$, $p = .01$, Cohen's $h = .11$.

Overall, this pattern of findings suggests that we were justified in creating our autonomy-supportive rationale and controlling rationale composite variables, since the effect that the manipulation had on each rationale within each composite moved in the same direction. Additionally, these findings show that the social background manipulation had a stronger effect on rationales that touted the independent (as opposed to interdependent) benefits of completing the assignment, with participants in the condition where the student was characterized as low-SES and Black being especially unlikely to relate the assignment to students' personal interests and especially likely to mention how doing the work could one day lead to a lucrative job.

Moderation by Participant Demographics

Exploratory analyses were conducted to test whether the effect of the student sociodemographic background manipulation on participants' likelihood of selecting an autonomy-supportive rationale as a first choice for motivating the amotivated student in the first vignette might differ between participants from different sociodemographic backgrounds. Specifically, we were interested in exploring whether individual characteristics such as race, gender, household income, metro area residence, political orientation, and teacher-likeness might influence participants' response to the student and moderate the effect of the manipulation (see Table 2.4). All analyses below were conducted using logistic regressions predicting the dichotomous autonomy-supportive rationale variable.

Table 2.4. Testing Moderation of Condition by Participant Background Characteristics

	Provision of Autonomy-Supportive Rationale (as First Choice on First Vignette)	
	Main Effect Models	Interaction Models
	b(SE)	*b(SE)*
Gender		
Intercept	.75(.02)***	.83(.02)***
Female	.04(.02)$^{+}$	-.01(.03)
Condition	--	-.14(.03)***
Female * Condition	--	.10(.04)*
Race		
Intercept	.72(.03)***	.76(.04)***
White, Non-Hispanic	.08(.03)**	.09(.04)*
Condition	--	-.08(.05)
White, Non-Hispanic * Condition	--	-.01(.06)
Income		
Intercept	.74(.03)***	.79(.3)***
$30,000 - $59,999	.07(.03)$^{+}$	.04(.05)
$60,000 - $84,999	.04(.04)	.04(.05)
$85,000 - $124,999	.04(.04)	.02(.05)
$125,000 or more	.05(.04)	.07(.05)
Condition	--	-.11(.05)*
$30,000 - $59,999 * Condition	--	.05(.07)
$60,000 - $84,999 * Condition	--	-.00(.08)
$85,000 - $124,999 * Condition	--	.04(.07)
$125,000 or more * Condition	--	-.03(.08)
Metro Status		
Intercept	.76(.03)***	.81(.04)***
Metro Area	.02(.03)	-.09(.06)
Condition	--	.01(.04)
Metro Area * Condition	--	.01(.06)
Political Orientation		
Intercept	.76(.02)***	.81(.03)***
Moderate	.02(.03)	.03(.05)
Conservative	.01(.03)	.00(.04)
Condition	--	-.09(.05)$^{+}$
Moderate * Condition	--	-.00(.06)
Conservative * Condition	--	.01(.06)
Teacher Likeness		
Intercept	.77(.01)***	.81(.02)***
Teacher-Like	.10(.03)**	.08(.04)*
Condition	--	-.09(.03)***
Teacher-Like * Condition	--	.04(.06)

Note. N = 2026. ***p < .001, **p < .01, *p < .05, ^{+}p < .10. For condition, 0 = High-SES-and-white, 1 = Low-SES-and-Black. For gender, reference is male. For race, reference is non-white. For income, reference is $0-29,999. For metro status, reference is non-metro area. For political orientation, reference is liberal. For teacher likeness, reference is non-teacher-like.

As a preview to our results, we found that many demographics predicted overall choices of rationales, but there were no interactions with the manipulation, with one exception: gender. This suggests that the bias against low-SES and black students was pervasive across most demographic groups.

Gender. Across conditions, male participants (75%) were slightly less likely to offer the student an autonomy-supportive rationale than female participants (80%), $b = .04$, $SE = .02$, $p = .07$. However, a significant interaction between condition and gender emerged, which indicated that the effect of condition among female participants was non-significant, $b = -.04$, $SE = .03$, $p = .23$, but the effect among males was significant, $b = -.14$, $SE = .03$, $p < .001$. Specifically, while 83% of males who first read the vignette about the disengaged high-SES and white student were inclined to select one of the autonomy-supportive rationales as the best option for motivating the student, only 69% of males who first read about the disengaged low-SES and Black student did so.

Race. Across conditions, white participants (80%) were significantly more likely to offer the student an autonomy-supportive rationale than Hispanic participants (68%), difference in proportions $b = -.12$, $SE = .04$, $p = .006$, and were marginally more likely to offer an autonomy-supportive rationale than Black participants (72%), $b = -.08$, $SE = .04$, $p = .06$. Moderation analyses showed that the effect of condition did not differ significantly between participants from different racial backgrounds.

Income. Relative to participants whose household income was less than $30,000 (74%), participants whose household income was between $30,000 to $59,999 (80%) were marginally more likely to offer the target student an autonomy-supportive rationale, $b = .07$, $SE = .03$, $p = .05$. Otherwise, likelihood of offering an autonomy-supportive rationale did not differ between any income groups. Additionally, household income did not

moderate the effect of condition on likelihood of offering an autonomy-supportive rationale.

Metro Area. Next, we explored whether likelihood of providing participants who did or did not lived in a metropolitan statistical area, since participants who live in or around major cities might perceive the student in the low-SES and Black condition differently than participants who live in more rural areas. We found that participants who lived in a metropolitan area (78%) were as likely to offer the amotivated student an autonomy-supportive rationale as participants who did not live in a metropolitan area were (76%), and that the effect of condition did not vary by metropolitan area.

Political Orientation. We also investigated whether participants' political orientation might moderate the effect of the student sociodemographic background manipulation. Past research has shown that conservatives are more likely than liberals to attribute (mis)behavior to internal causes (Clarkson et al., 2015; Schlenker et al., 2012), which suggests that conservatives may be more likely than liberals to judge that a student's situational amotivation indicates inner motivational deficiencies (e.g., laziness, lack of personal agency). If so, then we might expect to find that politically conservative participants are more likely to forgo offering an amotivated student an autonomy-supportive rationale, because they may believe that the student's inner motivational resources are too weak to leverage, and that it would instead be more effective to point out external incentives and remind the student of their obligation to engage (see Reeve, 2009). We may also expect to find that the effect of the student sociodemographic background manipulation would be stronger among conservative participants, who may be especially likely to attribute disengagement to inner motivational deficiencies if the student is low-SES and Black (see Starck et al., 2020).

We found that likelihood of offering the amotivated student an autonomy-supportive rationale as a first choice did not differ between participants whose political orientations were liberal (76%), moderate (79%), or conservative (77%). This finding conceptually replicates past research which found that teachers' political orientation was not related to their use of rationale provision as a means of motivating an amotivated student (Reeve, Bolt, & Cai, 1999). Surprisingly though, we also found that the effect of condition did not vary by political orientation, which indicates that, regardless of their political orientation, participants showed similar degrees of bias against offering an autonomy-supportive rationale to a low-SES and Black student in need of motivational support.

Composite demographic group: "Teacher-likeness". Finally, we investigated our assumption that teachers might be similar to the rest of the U.S. population in terms of their social biases, since our ability to generalize the findings from this sample to teachers rests in part on this assumption. As a basic test of this assumption, we explored whether participants' likelihood of offering the amotivated student an autonomy-supportive rationale might differ between participants who did or did not have a similar demographic background to that of the average U.S. secondary school teacher.

We constructed a variable to indicate "teacher-like" participants[1] (10% of the analytic sample) and found that teacher-like participants (87%) were significantly more likely than non-teacher-like participants (77%) to offer the amotivated student an

[1] Participants were deemed "teacher-like" either if they reported that their occupation was as a K-12 teacher, or, if they had the following demographic characteristics: White non-Hispanic, female, aged 26-68, had earned at least a Bachelor's degree, and had a household income between $25-174,999. Decisions about which race, gender, and education level would indicate teacher-like status among non-K-12 teachers were made based on NCES data on the demographic characteristics of the average U.S. K-12 public school teacher in 2011-2012 (Goldring et al., 2013). Decisions about which ages and household income values would indicate teacher-like status among non-K-12teachers were made by including whatever values fell within the 2.5th and 97.5th percentile of values observed in the K-12 teacher subsample.

autonomy-supportive rationale as a first choice, b = .10, SE = .03, p = .001. This finding is consistent with the notion that teachers may have had formal education in bets practices in motivational science. However, we also found that the effect of the sociodemographic background manipulation did not differ between teacher-like and non-teacher like participants; in other words, teacher-like adults were just as likely to fail to provide autonomy-support to Black and low-SES students as non-teacher-like adults were. This null finding conceptually replicates past research which has shown that U.S. teachers do not differ meaningfully from the U.S. general population in their degree of pro-white or anti-Black bias (Starck et al., 2020).

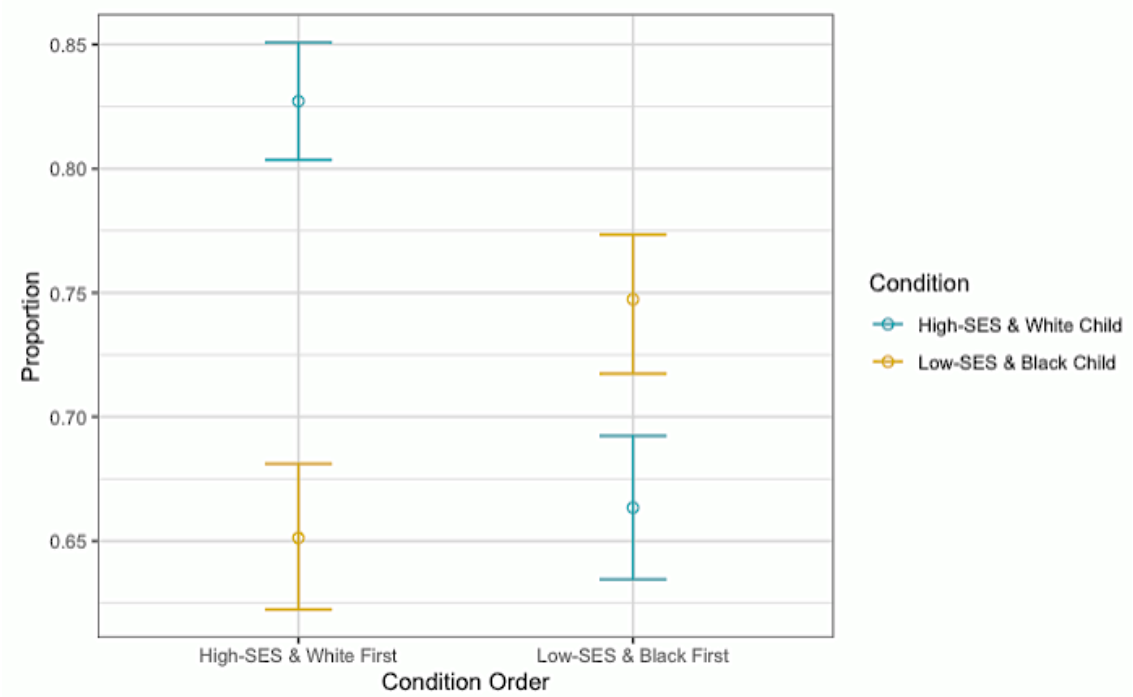
Within-Subjects Analyses

Finally, exploratory analyses were conducted to estimate the average within-subjects effect of the student sociodemographic background manipulation. We also explored potential order effects from the counter-balancing.

A repeated-measures ANOVA indicated that the effect of condition was statistically significantly, such that participants were more generally likely to select an autonomy-supportive rationale as a first choice after reading about the High-SES-and-white student (74%) than they were after reading about the Low-SES-and-Black student (70%), $F(1, 2008) = 16.85$, $p < 0.001$, $\eta_g^2 = 0.002$.

However, this main effect of condition was qualified by a significant and unexpected interaction between condition and condition order, $F(1, 2007) = 176.74$, $p < 0.001$, $\eta_g^2 = 0.021$. Pairwise t-tests indicated that the simple main effect of condition was significant among participants who were first exposed to the high-SES-and-white condition, $F(1, 971) = 146.85$, $p < 0.001$, $\eta_g^2 = 0.040$, as well as among participants who were first exposed to the Low-SES-and-Black condition, $F(1, 1036) = 40.72$, $p < 0.001$, $\eta_g^2 = 0.008$. However, surprisingly, the direction of this simple main effect differed by the

Figure 2.3. Effect of sociodemographic condition on probability of offering autonomy-supportive rationale as first choice, moderated by order of exposure



order in which conditions were exposed (see Figure 2.3). Among participants first exposed to the high-SES-and-white student, the likelihood of selecting an autonomy-supportive rationale as a first choice for motivating the amotivated student was greater in the high-SES-and-white condition (83%) than it was in the low-SES-and-Black condition (65%). That is, if participants were first anchored on a high-SES and white student, they then lowered their view of supporting a low-SES and Black student on the second trial.

Unexpectedly, among participants first exposed to the low-SES-and-Black student, the likelihood of selecting an autonomy-supportive rationale as a first choice was lower in the high- SES-and-white condition (66%) than it was in the low-SES-and-Black condition (75%). Overall, this pattern of findings suggests that participants were most likely to offer an autonomy-supportive rationale to whichever student they read about in the first vignette,

and that the negative effect of being exposed to the second vignette was larger among participants who had first read about the high-SES and white student.

Interestingly, between-group analyses indicate that the main effect of condition did not emerge during the second round of the experiment, $X^2(1, 2012) = .56$, $p = .56$, and this unexpected pattern may have emerged because participants, overall, tended to choose controlling rationales for the second amotivated student. Because of potential interpretive problems with the second vignette, we consider the within-subjects analysis to be exploratory and the between-subjects, less-confounded analysis to be primary.

DISCUSSION

This experiment found that, when given the chance to offer a hypothetical amotivated student a rationale for engaging in classwork, adults who read that the student was low-SES and Black were less likely to offer an autonomy-supportive rationale than those who read that the student was high-SES and white. This study provides the only known causal support for the hypothesized effect that students' racial and socioeconomic background can have on teachers' likelihood of using autonomy-supportive rationales to motivate class engagement. It also conceptually replicates past correlational research which suggests that teachers tend to use fewer autonomy-supportive practices, including rationale provision, with low-SES and Black students (Patall et al., 2013; Solomon et al., 1996; c.f. Patall et al., 2017, 2018).

One limitation of the present study is the low ecological validity of its materials. Due to restrictions on the length of the survey, U.S. adults in this sample were not allowed to self-generate the rationale that they provided to the hypothetical student. We used theory to inform the content of the four pre-written rationales, but it is possible that if they had been given the chance, adults might not have written any controlling rationales at all or

might have written rationales that have little relevance for students' sense of autonomy. Future research can address this limitation by allowing participants to naturally generate what rationale for learning they would offer to the amotivated student, and then categorizing their responses according to theoretical relevance.

One final noteworthy limitation of the present study is that the race and SES of the hypothetical student were manipulated at the same time, which makes it impossible to know whether the between-condition differences in autonomy support that emerged in this study were more driven by variation in the student's race or in their SES. The choice to manipulate these sociodemographic factors simultaneously was informed in part by awareness of the strong association between race, income, and community-type in the U.S., where suburban communities are majority white and have lower poverty rates, while urban communities are majority non-white and have higher poverty rates (Parker et al., 2018). However, future studies should aim to identify the unique effects that students' race and SES can have on their likelihood of receiving support sense of autonomy in school.

The results obtained in this nationally-representative sample are very likely to generalize to the broader population of U.S. adults, suggesting that there is a general bias in this nation against supporting Black and low-SES individuals' need for autonomy. Future research should aim to determine *why* racial and socioeconomic bias in autonomy support emerged in this sample; the proposed Study 3 will aim to answer this question. The results of this study may also be likely to generalize to the subpopulation of U.S. teachers, who tend to show the same racial biases as the U.S. general population (Starck et al., 2020). Future research will also need to test this hypothesis directly, and Study 2 aims to address this need.

Chapter 3: Are U.S. Teachers Less Likely to Spontaneously Offer Autonomy-Supportive Rationales to Black and Low-SES Students?

Autonomy-supportive rationales – often characterized by both internally-motivating content and choice-affording language – are among the best at deepening students' motivation and engagement in learning (Steingut et al., 2017; Vansteenkiste, Simons, Lens, et al., 2004). Study 1 demonstrated that U.S. adults are less likely to offer autonomy-supportive rationales to a Black and low-SES student struggling to stay engaged in learning than to a white and high-SES student, thus providing strong causal evidence in favor of the primary hypothesis of this dissertation. However, it is still necessary to test whether the findings from Study 1 will conceptually replicate within a naturalistic study of the subpopulation of U.S. adults most likely to find themselves in the type of scenario described in the vignette: U.S. teachers. In Study 1, everything from the race and SES of the target student to the SDT-inspired rationales that participants could offer the student were tightly controlled by the researcher. However, in the real world, teachers have very limited control over what students from what sociodemographic backgrounds they get assigned to, and they might or might not spontaneously generate rationales that can be classified among the dimensions of autonomy-supportiveness proposed by SDT. To improve the ecological validity of the evidence, it is important to conduct a naturalistic study of how the autonomy-related contents of real-life teachers' self-generated rationales vary as the racial and socioeconomic make-up of their real-life students varies. The present study serves as that study.

No known study has ever directly investigated how U.S. teachers' provision of autonomy-supportive rationales might vary with the racial and socioeconomic composition

of the students that they teach. One study found in a national sample that teachers in lower SES, majority Black schools were less likely to be observed using autonomy-supportive practices in the classroom (Solomon et al., 1996); however, this study did not investigate rationale provision as a practice that might vary with student race and SES composition. Another study found in a regional sample of U.S. students that students in lower SES schools reported weaker perceptions of rationale provision from their teachers (Patall et al., 2018); however, given its design, this study cannot speak to how the contents of teachers' spontaneously and directly-measured rationales might vary with student SES composition. One additional limitation of both studies is that their focus on the effect of school-level sociodemographic composition does not allow for an understanding of the within-school, teacher-level effects that student race and SES composition might have on teachers' provision of autonomy support via rationales.

The present study aims to address the limitations of past research and answer the question of whether U.S. teachers' likelihood of using autonomy-supportive rationales to increase their students' motivation and engagement in the classroom might vary as a function of the racial and SES composition of the students that they serve. This study provides the first known test of the hypothesis that teachers who teach a larger proportion of Black students and lower-SES students might be less likely to spontaneously generate autonomy-supportive rationales to offer to an amotivated student.

METHOD

Participants

The data come from the National Study of Learning Mindsets (NSLM; Yeager et al., 2019), a U.S.-based and nationally-representative motivation intervention and survey

study that took place during the 2015-2016 school year[2]. All teachers who taught 9th grade math at one of the 76 participating U.S. public high schools were invited to participate in a Math Teacher Survey. Three-hundred and twenty-one teachers (91% of those invited) agreed to participate, and 290 participating teachers (82% of those invited) responded to the focal open-ended survey question that prompted teachers to provide rationales to an amotivated student. Of those who responded to the rationale provision prompt, 255 teachers (72% of those invited) were linked to four or more ninth-grade students – our minimum threshold for reliable teacher-level estimates of student sociodemographic composition – from whom or about whom race/ethnicity and SES data was collected as part of the NSLM. It was these n = 255 teachers, from 64 participating high schools, who comprised the analytic sample for this study.

The demographic characteristics of the analytic sample of teachers (61% female; 86% white; 4.3% Black; 4.7% Asian; 3.6% Hispanic/Latinx) did not differ meaningfully from those of the larger sample of teachers who participated in the Math Teacher Survey, and also appears to be representative of the demographic characteristics of the population of U.S. high school teachers during the 2015-2016 school year (Taie & Goldring, 2017).

[2] This study uses data from the National Study of Learning Mindsets (doi: 10.3886/ICPSR37353.v1)(PI: D. Yeager; Co-Is: R. Crosnoe, C. Dweck, C. Muller, B. Schneider, & G. Walton), which was made possible through methods and data systems created by the Project for Education Research That Scales (PERTS), data collection carried out by ICF International, meetings hosted by the Mindset Scholars Network at the Center for Advanced Study in the Behavioral Sciences at Stanford University, assistance from C. Hulleman, R. Ferguson, M. Shankar, T. Brock, C. Romero, D. Paunesku, C. Macrander, T. Wilson, E. Konar, M. Weiss, E. Tipton, and A. Duckworth, and funding from the Raikes Foundation, the William T. Grant Foundation, the Spencer Foundation, the Bezos Family Foundation, the Character Lab, the Houston Endowment, the National Institutes of Health under award number R01HD084772-01, National Science Foundation under grant number 1761179, Angela Duckworth (personal gift), and the President and Dean of Humanities and Social Sciences at Stanford University. This research was supported by grant, P2CHD042849, Population Research Center, awarded to the Population Research Center at The University of Texas at Austin by the Eunice Kennedy Shriver National Institute of Child Health and Human Development. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health, the National Science Foundation, or other funders.

On average, teachers in the analytic sample had been teaching for M = 13.27 (SD = 10.13) years and were linked to M = 53.45 (SD = 33.52; range: 5 to 155) ninth-grade students.

Survey Sampling Procedure

Data on how teachers would attempt to motivate an amotivated student were obtained through a single open-ended question on the Math Teacher Survey. The Math Teacher Survey was a 45-minute web-based questionnaire that was administered as part of the NSLM and was described to teachers as an opportunity to contribute to the improvement of math education by sharing their thoughts about their classes, students, and themselves. The Math Teacher Survey remained active from November 2015 to March 2016. Participating teachers were compensated with a $50 gift card.

Links between teachers and their math students were established primarily through official school records. Alternatively, where schools declined to share these records, links were established through an open-ended question that asked students to indicate who their 9th grade math teacher was. This question was asked on the first of two web-based surveys that students completed in their school's computer labs as part of the NSLM.

Data on the racial/ethnic background of linked students were obtained through self-reports on the first student survey, and where self-reports of race/ethnicity were missing, these data were instead obtained from school administrative records. Data on the socioeconomic background of the students linked to each teacher were obtained via a self-report item to which students who participated in the first student survey responded.

Measures

Teacher Spontaneous Generation of Rationales

Teachers were asked to read the following vignette about a hypothetical student in need of motivational support:

Imagine one of your math students was uninterested in math class and seemed really disengaged, even though the student had the ability to do well. You hear the student say, 'What's the point?' The student doesn't see how math is relevant at all. Imagine you wanted to say or do something to motivate this student. What would you say or do?

After reading the prompt, teachers were asked to write a few sentences describing how they would respond to the hypothetical student. These responses were then coded to produce the focal dependent measures, as described in the analytic procedure section.

This writing prompt was designed to evoke teachers' spontaneously-generated rationales by making it clear to them that the hypothetical student was seeking a reason to engage in math class. Two additional features of this writing prompt lend themselves to an investigation of how teachers' rationale content might vary with the sociodemographic composition of their students. First, the prompt asks teachers to imagine that the hypothetical student is one of their own math students. This wording allows us to make the key assumption on which the primary analysis of this study relies: that teachers are responding to the hypothetical student in a way that is typical of how they would respond to one of their real-world students under similar circumstances (i.e., when showing signs of amotivation). To the extent that this assumption holds, we can expect that the content of the rationales that teachers offer the hypothetical student might vary with the sociodemographic composition of their real-life students. A second reason why this prompt is well-suited for this investigation is that it clearly mentions that, despite their current low

engagement, the hypothetical student is capable of doing well in math class. This wording helps to reduce the degree to which assumptions about the student's academic ability might confound the relationship between the assumed race/ethnicity and SES of the hypothetical student and the content of teachers' rationales.

Teacher-Level Student Racial/Ethnic Composition

Students who participated in the first NSLM student survey self-reported their race/ethnicity via a single item that asked them to indicate which racial/ethnic group(s) they identified as members of. The response categories were white, Black, Hispanic, Asian, Native American, Pacific-Islander, Middle Eastern, and other. Wherever student self-reports were missing (because they either did not respond to the survey item or did not participate in the first NSLM student survey), data on their racial/ethnic background was imputed from race/ethnicity data obtained from school administrative records.

From this imputed variable, the following five binary indicators of student-level racial/ethnic background were created (where 0 = *No*, 1 = *Yes*): Black, Hispanic (non-Black), Native (non-Hispanic, non-Black), Asian (non-Native non-Hispanic non-Black), white (non-Asian non-Native non-Hispanic non-Black), and other[3] (non-white non-Asian non-Native non-Hispanic non-Black). Using these student-level indicators, five teacher-level student racial/ethnic composition variables were created by taking the within-teacher average of their students' responses to each indicator, yielding the proportion of students from each racial/ethnic group for each teacher.

[3] The 'other' racial/ethnic category was comprised of students who identified solely as either Pacific islander/Hawaiian Native, Middle Eastern, or some other race, without identifying as Black, Hispanic, Native, Asian, or white.

Teacher-Level Student SES Composition

Students who participated in the first NSLM student survey self-reported also self-reported the highest level of education that their mother completed, on an 8-point scale (1 = *Did not finish high school*, 2 = *Finished high school, no college degree*, 3 = *Took some college courses, no college degree*, 4 = *Associate's degree (community/junior college)*, 5 = *Bachelor's degree (four-year college/university)*, 6 = *Master's degree*, 7 = *Doctorate: Lawyer, Doctor, or Ph.D.*, 8 = *Do not know*).

Prior to aggregating this item up to the teacher level, any cases where students had indicated that they did not know their mother's educational attainment (~15% of cases) were recoded from a value of 8 on this item to a value of 2.5, indicating that their mother had at least finished high school but had not yet attended college. This recoding was done because previous research conducted in the NSLM has shown that students who did not know their mother's education showed motivation and achievement outcomes similar to children of non-college-educated mothers (see Destin et al., 2019). Following recoding, the teacher-level student SES variable was created by taking the within-teacher average of their students' responses to this item, yielding the average maternal education for each teacher.

Analytic Procedure

Content Analysis

Teachers' responses to the open-ended prompt were content analyzed (Krippendorff, 2018; Schreier, 2012). The goal of this analysis was to identify the presence or absence of autonomy-related content and language within each teacher's words, in order to then create a single binary indicator of whether or not teachers offered the hypothetical student the type of rationale that best supports autonomous motivation and high-quality

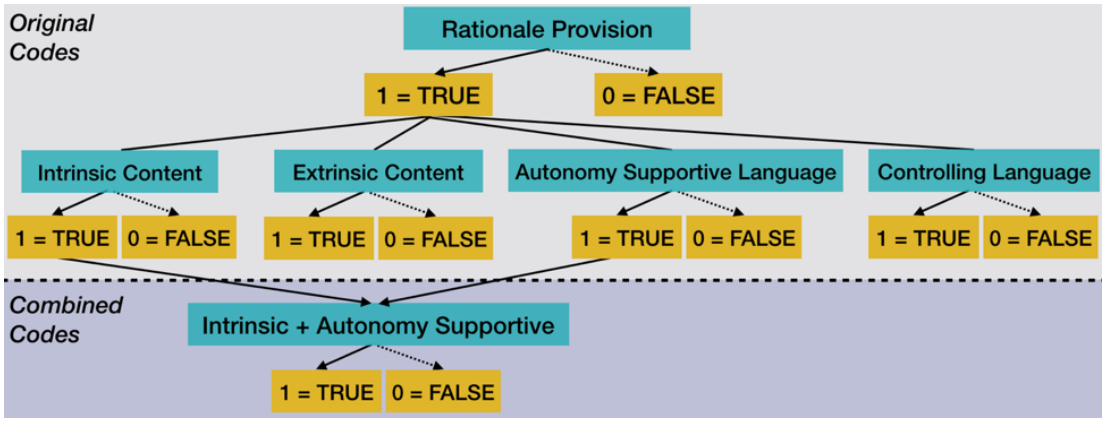
academic engagement. To arrive at this single indicator of autonomy support, I followed a multi-step human coding process, described in the following sections.

Coding Frame and Protocol. Appendix A contains the coding frame (i.e., codebook) against which teachers' responses to the writing prompt were coded for autonomy-related content and language. The particular code categories against which teachers' responses were judged were derived from SDT, particularly those of SDT's organismic integration mini-theory (see Ryan & Deci, 2017b) and goal contents mini-theory (see Ryan & Deci, 2017a).

Jointly, research based in these mini-theories suggests that the rationales which best support students' sense of autonomous motivation and engagement are those that use language which conveys choice (e.g., "you can", "you may") to explain to students how their academic work is related to their inner motivational resources – i.e., their existing interests, well-internalized goals, and intrinsic life goals (see Reeve et al., 2002; Vansteenkiste et al., 2018; Vansteenkiste, Simons, Lens, et al., 2004). In contrast, this research suggests rationales most likely to foster a strong sense of controlled motivation and engagement within students are those that bypass these inner motivational resources, and instead use pressurizing language (e.g., "you must", "you should") to explain to students how their academic work is related to external motivational sources – e.g., external rewards and punishments, self-worth concerns, or extrinsic life goals.

Thus, informed by this research, I developed a hierarchical coding frame containing five unique code categories (see Figure 3.1), with the ultimate goal of using

Figure 3.1. Hierarchical coding scheme used to categorize teachers' responses to the rationale provision writing prompt



these five categories to build toward the creation of an indicator of the provision of the most highly motivating type of rationale (i.e., that which has internally motivating content and choice-affording language). As depicted in the decision tree displayed in Figure 3.1, teachers' responses were first coded for whether or not they offered the hypothetical student a rationale for engaging in math (*Rationale Provision*; 0 = *No*, 1 = *Yes*). Responses that received a 1 on *Rationale Provision* were then coded for the presence of references to one or more internal sources of motivation to engage in math (*Intrinsic Content*; 0 = *No*, 1 = *Yes*) and, independently, for references to one or more external sources of motivation (*Extrinsic Content*; 0 = *No*, 1 = *Yes*). Responses that received a 1 on *Rationale Provision* were also coded for the presence of language likely to make the hypothetical student feel they have a choice over whether to engage in math (*Autonomy-Supportive Language*; 0 = *No*, 1 = *Yes*) and, independently, for language likely to make the student feel pressured to engage (*Controlling Language*; 0 = *No*, 1 = *Yes*). Lastly, once all responses were coded, the focal dependent variable indicating the presence of both internally-motivating content and choice-affording language was created (*Intrinsic + Autonomy-Supportive*; 0 = *No*, 1 = *Yes*). Having a value of 1 on this variable indicated that the teacher offered the hypothetical

student the type of rationale that best supports autonomous motivation and high-quality academic engagement.

Content analysis is systematic in that coding of the text proceeds in a fixed (though not necessarily linear) sequence of steps intended to maximize the reliability and replicability of researchers' findings (Groeben & Rustemeyer, 1994; Krippendorff, 2018). Appendix B contains a description of the procedures that were followed while coding teachers' responses to the writing prompt. It details the way in which human coders were recruited and trained, as well as the procedures for developing and refining the coding frame, carrying out the main coding, and resolving disagreements in coding.

Evaluating Coding Results. Analysis of the results from the content analysis included an examination of the frequency with which each code occurred in the analytic sample, as well as assessments of the reliability of the coding. These analyses were conducted in R (R Core Team, 2020).

Interrater reliability was assessed by calculating both the percent agreement between coders (a highly liberal metric of interrater agreement) and Krippendorff's alpha, a highly robust and conservative metric that adjusts for the likelihood that agreement might have been obtained by chance (Krippendorff, 2004, 2018). Indeed, the formula for Krippendorf's alpha accounts for both the frequency with which mismatches occurred between coders and the relative frequency with which a coded theme occurs across the dataset, such that the resulting alpha value becomes more sensitive to the number of mismatches as the relative frequency of a code's occurrence approaches either 0% or 100% (Krippendorff, 2004). For the percent agreement, the minimum desired coefficient is 90% (Lombard et al., 2002); for Krippendorff's alpha, the minimum desired value of this statistic is $\alpha = .80$, however, tentative conclusions can be made with an alpha $\alpha \geq .667$ (Krippendorff, 2004).

Quantitative Analysis

All analyses involving the teacher-level student sociodemographic composition variables were conducted in R (R Core Team, 2020).

Preliminary analyses examined the distribution of the teacher-level student racial/ethnic and SES composition variables across all teachers in the analytic sample. Scatterplots (not shown) indicated that teachers who were linked to fewer students tended to have more extreme values on these composition variables– which makes sense considering that less reliable data should lead to more extreme positive values. In order to limit the extent to which imprecision in the measurement of teacher-level sociodemographic composition might affect estimates of the relationship between student composition and the presence of certain codes in teachers' response to the hypothetical student, any outliers observed on these student composition variables were capped at nearest non-outlier value.

Primary analyses used both independent-samples t-tests and generalized additive modeling (GAM; see Hastie & Tibshirani, 1990) to test the hypothesis that teachers might be less inclined to offer Black and low-SES students the type of rationales that best support autonomous motivation and high-quality academic engagement. GAMs, like generalized linear models (GLMs), allow for non-normally distributed errors; however, while GLMs require analysts to make assumptions about what functional form the relationship between the independent and dependent variables takes, GAMs allow this relationship to be estimated non-parametrically (Hastie & Tibshirani, 1990; Keele, 2008; Wood, 2017).

First, independent-samples t-tests were run to examine whether teachers who received different values on three code categories (*Intrinsic Content*, *Autonomy-Supportive Language*, and *Intrinsic + Autonomy-Supportive*) showed statistically significant differences in the sociodemographic composition of their linked students (using the capped

variables). Then, in a single GAM model, the variable indicating teachers' provision of an *Intrinsic + Autonomy-Supportive* rationale was regressed onto the capped teacher-level racial/ethnic composition and SES composition variables. By excluding from the model the composition variable which indicated the proportion of linked students who identified as white, I made the reference group in this model teachers who were linked to middle-SES white students. Thus, the model tested whether the teachers' likelihood of providing this highly-motivating rationale changed as the average SES of their linked students increased (holding racial/ethnic composition constant) and as the proportion of linked students who identified as either Black, Hispanic, Native American, or other increased (holding SES composition constant).

RESULTS

Content Analysis

Code Frequencies

On average, teachers wrote $M = 51.77$ ($SD = 33.02$; range 6 to 200) words and $M = 2.94$ ($SD = 2.17$; range 1 to 17) sentences in response to the rationale provision writing prompt. Table 3.1 reports the frequencies with each code category occurred across the sample of responses, and provides examples of typical responses observed within each category.

Table 3.1. Results from Content Analysis of Teachers' Response to the Hypothetical Student

Code	Rate	Definition	Example Responses	Percent Agreement	Krippendorff's alpha
Rationale Provided	91%	Teacher attempts to offer a reason why effort might be useful, important, or worthwhile	"Let's consider some real world examples."	92.9%	0.81
Intrinsic Content	71%	Rationale refers to one or more internal sources of motivation (intrinsic interests, intrinsic life goals, internalized goals or values)	"I would ask if the student has any idea of what they want to do after high school and try to make a connection to their life and math."	86.3%	0.72
Extrinsic Content	11%	Rationale refers to one or more external sources of motivation (external incentives, extrinsic life goals, conditional regard)	"I would tell the student, that math is all about problem solving and most jobs will want to hire people who can problem solve."	95.3%	0.66
Autonomy-Supportive Language	13%	Teacher's word choice is likely to make student feel that subsequent decision to engage would be freely made	"I understand your frustration with the relevance of math."	89.7%	0.53
Controlling Language	16%	Teacher's word choice is likely to make student feel that subsequent decision to engage would be due to pressure	"I would try to figure out why they have a negative outlook on math and education"	90.2%	0.56
Intrinsic + Autonomy Supportive	11%	Rationale refers to one or more internal sources of motivation and teacher's word choice is likely to make student feel that subsequent decision to engage would be freely made	"I know you may not see the importance of math right now, but there are many careers where math is very important. What kinds of interests do you have where you think math is somewhat useful?"	N/A	N/A

Note. Percent agreement and Krippendorff's alpha could not be calculated for the *Intrinsic + Autonomy-Supportive* code because it was a combination of other codes.

Fully 91% of teachers attempted to motivate the hypothetical amotivated student by offering them a rationale for engaging in math (*Rationale Provided*). Concerning the content of these rationales, 71% of teachers offered the student a rationale that mentioned one or more

- internal sources of motivation to engage in math (*Intrinsic Content*). These included rationales that mentioned how math might relate to:
- the student's intrinsic interests (e.g., "What is something you like to do? Let's see how math is important in making that work out!"),
- their personally-valued goals, e.g., their desired career (e.g., "What is your dream career? Then we could figure out how math will be used in their future to make it more relevant"), and
- the fulfillment of an intrinsically meaningful life goal, e.g., intellectual growth (e.g., "Math is more than just numbers. Becoming better problem solvers is the main goal.").

In contrast, 11% of teachers who offered the student a rationale tried to motivate the student by mentioning one or more external sources of motivation to engage in math (*Extrinsic Content*). These included rationales that mentioned how math might relate to:

- external incentives to learn math, e.g., pending evaluations of their skills (e.g., "My first thought would be to make the importance of learning the math about the student's grades."), and
- the fulfillment of extrinsic life goals, e.g., image (e.g., "The point is...so that you can show you are teachable.")

Overall, these initial findings replicate the experimental results reported in Chapter 3, which showed that U.S. adults were generally more inclined to offer an amotivated student a rationale that had intrinsic content rather than they were offer one with extrinsic content.

Concerning the language that teachers used to deliver rationales to the hypothetical student, Table 3.1 shows 13% of teachers communicated their rationale in ways likely to make the student feel that they have a choice over whether to engage in math (*Autonomy-Supportive Language*). This included delivering rationales in a way that:

- used inviting language (e.g., "Let's see if we can…"),
- acknowledged the student's perspective (e.g., "Often times we see classwork and want to know exactly how we are going to be applying this specific concept every single day in life."), and
- supported the student's other psychological needs, e.g., the need to feel competent (e.g., "You have the ability to do very well in this class.")

By comparison, 16% of teachers communicated their rationale in a way likely to make the student feel pressured to engage in math (*Controlling Language*), for example, by using language that:

- suggests the student has an externally-imposed obligation to engage (e.g., "I would...let them know you will check on them to see if they are staying on point"), and
- discourages the student from expressing negative feelings (e.g., "How is that supposed to work if you are complaining about my math class?").

Finally, 11% of teachers offered the hypothetical student a rationale characterized by both intrinsic content and autonomy-supportive language (*Intrinsic + Autonomy-Supportive*) – for example, a rationale that both acknowledged the student's perspective and related math to their personally-valued goals: "I know you may not see the importance

of math right now, but there are many careers where math is very important. What kinds of interests do you have where you think math is somewhat useful?"

Interrater Reliability

As shown in Table 3.1, interrater reliability was quite high for all five codes when evaluated as percent agreement between coders (86% or higher for all codes). However, evaluations using Krippendorf's alpha indicated that only one code (*Rationale Provision*) had an associated alpha value within the desired range ($\alpha \geq .80$), and only two other codes (*Intrinsic Content* and *Extrinsic Content*) had associated alpha values at or above the lowest acceptable limit for making conclusions ($\alpha \geq .667$). Concerning the low alphas observed on the two language codes (*Autonomy-Supportive Language* and *Controlling Language*), the brevity of teachers' responses coupled with the fact that many teachers worded their responses as if they were directly addressing the *researcher* as opposed to the *student* (e.g., "I would tell them that…") made it challenging at times for the coders to discern whether teachers might have intended to deliver their rationales in an autonomy-supportive vs. controlling way. Since the value of Krippendorff's alpha becomes more sensitive to mismatches as the relative frequency of a code's occurrence approaches zero (Krippendorff, 2004), the reliability of the language codes suffered on this conservative metric.

Quantitative Analyses

Preliminary Analysis

Distribution of capped sociodemographic composition variables. Table 3.2 shows that, on average, 12% of the students to whom a teacher was linked were Black, 17% were Hispanic, 3% were Native American, 4% were Asian, 55% were white, and

Table 3.2. Distribution of Capped Teacher-Level Student Sociodemographic Composition Variables

Teacher-Level Student Sociodemographic Composition	M	SD	Observed Range
Proportion Black	.12	.11	.00 to .33
Proportion Hispanic/Latinx, non-Black	.17	.17	.00 to .53
Proportion Native/Indigenous, non-Hispanic/Latinx, non-Black	.03	.04	.00 to .12
Proportion Asian, non-Native/Indigenous, non-Hispanic/Latinx, non-Black	.04	.04	.00 to .16
Proportion white, non-Asian, non-Native/Indigenous, non-Hispanic/Latinx, non-Black	.55	.27	.00 to 1.00
Proportion other, non-white, non-Asian, non-Native/Indigenous, non-Hispanic/Latinx, non-Black	.02	.03	.00 to .09
Maternal Education Level	3.46	.79	1.93 to 5.55

2% were some other race/ethnicity. Still, teacher-level racial/ethnic composition varied widely across the analytic sample: for example, several teachers were linked to no Black students at all (i.e., 0%), while other teachers were linked to students who 33% Black (the capped maximum).

The average value of teacher-level SES composition was M = 3.46 (SD = .79), indicating that the average teacher was linked to a set of students whose mothers had on average earned an education somewhere between completing some college courses and completing an Associate's degree. However, as with the racial/ethnic composition variable, the SES composition variable also varied widely, from a minimum of M = 1.93 (i.e., most linked students had mothers who finished high school) to a maximum of M = 5.55 (i.e., most linked students had mothers who completed either a Bachelor's degree or a Master's degree). Thus, there was sufficient variation on these sociodemographic variables to test our primary hypotheses.

Table 3.3. Results of T-tests of Differences in Teacher-Level Student Sociodemographic Composition by Code Presence

	Intrinsic Content				Autonomy-Supportive Language				Intrinsic Content + Autonomy-Supportive Language			
Teacher-Level Student Composition	0 M (SD)	1 M (SD)	t	p	0 M (SD)	1 M (SD)	t	p	0 M (SD)	1 M (SD)	t	p
Proportion Black	**0.12 (0.11)**	**0.11 (0.11)**	**0.80**	**0.42**	**0.12 (0.11)**	**0.09 (0.08)**	**2.17**	**0.03**	**0.12 (0.11)**	**0.08 (0.08)**	**1.97**	**0.06**
Proportion Hispanic	0.15 (0.17)	0.17 (0.17)	-0.68	0.50	0.16 (0.17)	0.21 (0.18)	-1.43	0.16	0.16 (0.17)	0.24 (0.19)	-1.99	0.06
Proportion Native	0.03 (0.04)	0.03 (0.04)	-0.82	0.41	0.03 (0.04)	0.03 (0.03)	0.18	0.86	0.03 (0.04)	0.03 (0.03)	0.13	0.90
Proportion Asian	0.04 (0.04)	0.05 (0.05)	-1.29	0.20	0.04 (0.04)	0.05 (0.04)	-0.32	0.75	0.04 (0.04)	0.04 (0.05)	-0.22	0.83
Proportion white	0.54 (0.28)	0.55 (0.26)	-0.22	0.83	0.55 (0.27)	0.57 (0.25)	-0.50	0.62	0.55 (0.27)	0.53 (0.26)	0.29	0.77
Proportion other	0.03 (0.03)	0.02 (0.03)	2.30	0.02	0.02 (0.03)	0.02 (0.02)	1.14	0.26	0.02 (0.03)	0.01 (0.02)	2.74	0.009
Average Maternal Education Level	**3.37 (0.74)**	**3.50 (0.81)**	**-1.26**	**0.21**	**3.46 (0.77)**	**3.46 (0.94)**	**-0.08**	**0.93**	**3.47 (0.77)**	**3.38 (0.93)**	**0.49**	**0.63**

Note. $N = 255$ 9th-grade math teachers. Focal comparisons **bolded**.

Primary Analysis

T-tests. Table 3.3 reports the results of independent-samples t-tests that compared the racial/ethnic composition and socioeconomic status of teachers' students as a function of teachers' value on three rationale codes: *Intrinsic Content*, *Autonomy-Supportive Language*, and *Intrinsic + Autonomy-Supportive*. The key finding from this analysis was that teachers who spontaneously generated rationales couched in *Autonomy-Supportive Language* were linked to significantly fewer Black students ($M = .09$) than were teachers who did not generate rationales couched in this type of language ($M = .12$), $t = 2.17$, $p = .034$ (columns 5-8, Row 1, Table 3.3).

One interesting pattern also emerged where teachers who spontaneously generated *Intrinsic + Autonomy-Supportive* rationales were linked to marginally fewer Black students

than were teachers who did not generate this type of rationale (columns 9-12, Row 1, Table 3.3). Lastly, t-tests did not show any significant differences in student SES composition as a function of these three codes. In summary, these t-tests provided the first early evidence from a national sample of U.S. teachers are less likely to offer their Black students the type of rationales that support deep motivation and high-quality engagement in learning.

Generalized Additive Models (GAMs). Building on these t-test results, I next used a GAM model to understand the functional form of the relationship between the racial and SES- composition of teachers' real-life students and their likelihood of offering the hypothetical student an *Intrinsic + Autonomy-Supportive* rationale. The parameter estimates and the statistical tests for the GAM model are presented in Table 3.4. Since the GAM uses non-parametric spline functions to estimate the effect of continuous variables in the model – and these effects are not easy to grasp by simply looking at a table – I have plotted the non-parametric effects in Figure 3.2.

Proportion Black. The GAM model showed that there was a negative, linear association between the proportion of Black students linked to a teacher and the teacher's likelihood of offering the hypothetical student an *Intrinsic + Autonomy-Supportive* rationale, $\chi^2(1) = 6.64$, $p = .010$ – an association which had been suggested by the t-tests. This association is plotted in the top left panel in Figure 3.2, which shows that as the proportion of Black students increases from 0% to 33%, the probability that a teacher will offer the hypothetical student this highly motivating rationale for engaging in math decreases linearly.

SES Composition. Interestingly, while the t-tests showed no difference in student SES composition as a function of *Intrinsic + Autonomy-Supportive* rationale provision,

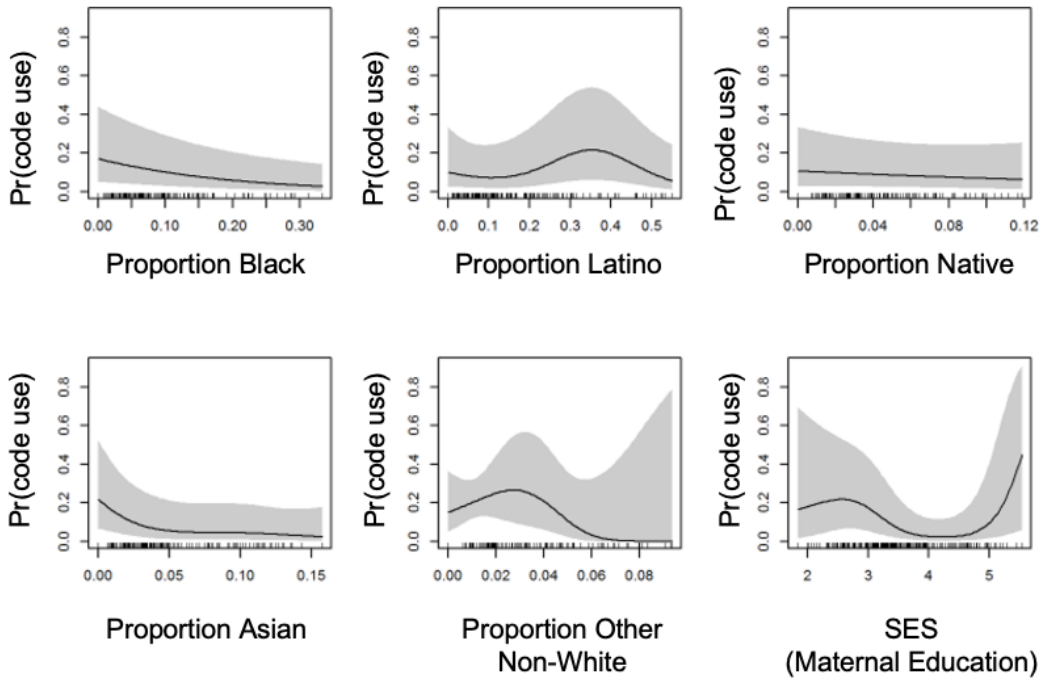
Table 3.4. Results of GAM Models Predicting Intrinsic + Autonomy-Supportive Code Usage

	Intrinsic Content + Autonomy-Supportive Language			
Parametric Coefficients	*Estimate*	*Standard Error*	*Z Value*	*p-value*
Intercept	-2.35	0.77	-3.07	0.002
Teacher Male	-1.14	0.38	-3.02	0.003
Teacher Non-White	-0.02	0.48	-0.03	0.97
Teacher Has Masters	0.43	0.32	1.36	0.17
Smooth Terms	*edf*	*df*	χ^2	*p-value*
Proportion Black	**1.00**	**1.00**	**6.64**	**0.010**
Proportion Hispanic/Latinx	2.64	2.89	5.24	0.09
Proportion Native/Indigenous	1.00	1.00	0.11	0.74
Proportion Asian	1.00	1.00	5.01	0.025
Proportion other	2.06	2.41	3.97	0.34
Maternal Education	**2.85**	**2.98**	**18.35**	**0.000**
Adjusted R2	.277			

Note. ** $p < .01$, * $p < .05$, $^{+}$ $p < .10$. Dummy indicators of whether or not teachers had any students from each racial/ethnic group were also included in this model but were suppressed from the model output for simplicity. Focal effects **bolded**.

the GAM model did detect a strong effect of SES on teachers' spontaneous generation of this type of rationale, $\chi^2(1) = 18.35$, $p = .000$. However, as shown in the bottom-right panel of Figure 3.2, this pattern was non-linear and difficult to interpret. Although parts of the curve could be interpreted as being consistent with our hypothesis (i.e., teachers' likelihood of providing this highly motivating rationale increases as average SES composition increased above a value of 4, i.e, average maternal education level above an Associate's degree), other parts could not. Overall, there seems to be mixed evidence, at best, in support of the hypothesized effect of SES composition on teachers' rationale contents.

Figure 3.2. Partial effects from generalized additive model of teacher-level student composition predicting provision of Intrinsic + Autonomy-Supportive rationale



DISCUSSION

This study used a nationally-representative sample of 9th grade math teachers and their students to answer one key question: Are teachers less likely to offer the type of rationales that best support autonomous motivation and high-quality academic engagement to Black students and low-SES students? The results were clearer for the former group than for the latter. I found that teachers are less likely to use the kinds of rationales that are well-known to evoke a deeper commitment to learning when they teach a larger proportion of Black students. This was true even after controlling for factors such as teachers' own race/ethnicity and whether they were well-trained (e.g. had a Master's degree). The story for SES was more mixed, in that the average SES of teachers' students had an effect on their provision of the most highly motivating rationales, but the relationship was difficult

to interpret. To reach more conclusive answers about the independent effects of student race and SES on teachers' rationale contents, a precisely controlled experiment is needed in which those characteristics are causally manipulated; Study 3 is designed to provide that experiment.

The present study provides the first known evidence in a national sample that teachers' spontaneous motivational approaches vary as a function of the race of the student in need of motivational support. That the study was conducted in a nationally-representative sample suggests that its findings are likely to generalize to the entire population of 9th grade math teachers in the U.S. This could have several implications, one of which is to suggest that, across the nation, Black students – who are stigmatized in the U.S. cultural context as not valuing school as much as students from other groups (e.g., Chang & Demyan, 2007) – are actually more likely to be deprived of support from teachers for deeply valuing what it is they are learning in school. Over time, racial inequality in motivational climate may very well translate into the racial achievement gaps currently observed at the national level (Musu-Gillette et al., 2017).

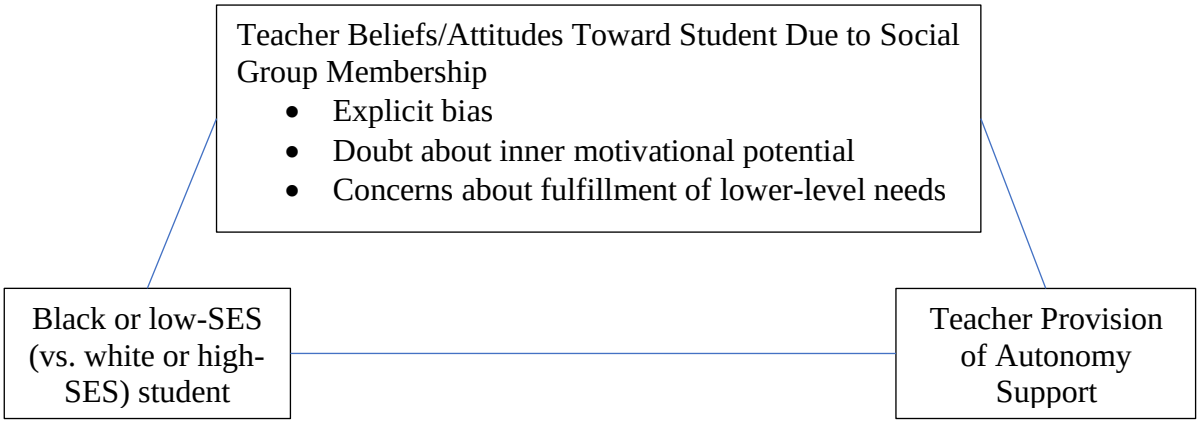
In summary, the present study illustrates the real-world applicability of the findings presented in Study 1. It also highlights an urgent need to learn *why* teachers might be depriving Black students of rationales that support high-quality motivation – which is what I aim to investigate in Study 3.

Chapter 4: Student Race and Social Class and Teacher Autonomy Support: Testing Unique Causal Effects and Exploring Mediators

The two preceding studies provide converging evidence that U.S. teachers are less likely to offer autonomy-supportive rationales for class engagement to students who are Black and low-SES. However, yet some key questions remain. First, since Study 1 manipulated student race and student SES simultaneously, it remains unclear what *unique* causal effects these factors might have on adults' willingness to offer autonomy-supportive rationales – i.e., whether the effect of student race on teachers' provision of autonomy support would still emerge if student SES was held constant, and vice versa. Second, since Study 1 relied on researcher-generated rationales and Study 2 was not designed to support causal claims, it remains unclear whether the types of rationales that U.S. teachers self-generated might be sensitive to a manipulation of student race and SES. Lastly, neither of the preceding studies investigated factors that might serve as mechanisms through which student race and SES has a causal effect on teacher autonomy support.

The present study seeks to address the limitations of the preceding studies while providing another causal test of how student race and SES influence teacher autonomy support via rationale provision. This study manipulates student-level race independent of student-level SES. It also includes continuous measures of U.S. adults' willingness to offer a target student both the researcher-generated rationales from Study 1 and some rationales adapted from teachers' self-generated responses from Study 2. Lastly, the present study investigates three psychological mechanisms through which student race and SES might influence teachers' provision of autonomy-supportive rationales (see Figure 4.1). These factors are:

Figure 4.1. Hypothesized mediational model



explicit bias against a student, doubt about a student's inner motivational potential, and concerns about a student's lower-level need fulfillment. All three factors vary in the degree to which they represent unobjective, prejudiced feelings toward a student that might in turn lead a teacher to intentionally deprive the student of opportunities to feel willingly engaged in schoolwork. However, to the extent that these biases, doubts, and concerns are stratified by student race and SES in teachers' minds, all three factors have the potential to yield the same undesirable outcome of social disparity in teachers' provision of autonomy support.

The present study aimed to conceptually replicate the findings of Study 1, by testing the hypotheses that U.S. adults are less likely to offer autonomy-supportive rationales (and more likely to offer controlling rationales) to a situationally amotivated student if that student is Black (vs. white) or low-SES (vs. high-SES). It also tested the hypothesis that U.S. adults will report more explicit bias against, more doubts about the inner motivation of, and more concern for the lower-level needs of a situationally amotivated student if that student is Black (vs. white) or low-SES (vs. high-SES). Lastly, it tests the hypothesis that U.S. adults who report greater bias, doubts, and concerns will be less likely to offer

autonomy-supportive rationales (and more likely to offer controlling rationales) to the target student.

METHOD

Preregistration

This study's hypotheses, desired sample size, variables, procedure, and planned analyses were preregistered on Open Science Framework (https://osf.io/3anqk) prior to any data being collected.

Participants

Data was collected in Spring 2021 from a national, non-representative sample of U.S. adults who were randomly selected from an online panel maintained by the private survey research firm, Dynata. All panelists who were U.S.-based adults between the ages of 18 and 75 were eligible to participate in this study.

An a priori statistical power analysis (conducted in G*Power; Faul et al., 2009) had determined that N = 436 was the minimum sample size needed in order for a one-way ANOVA with four groups to be sufficiently powered to reject the null hypothesis (at α = .05) at least 95% of the time when the effect size is Cohen's f = .204. The preregistered target sample size was 1000 participants; however, after reaching this target, the survey was re-fielded after observing that some participants may been from bots. In the end, data was collected from N = 1222 participants.

As was pre-registered, participants were excluded from the analytic sample if they took more than sixty minutes to complete the survey in which the study was embedded, if

[4] Expectation of an effect size around .20 was influenced by the findings of Study 1, which showed that the student sociodemographic background manipulation had an effect around that size (Cohen's h = .22) on the responses of U.S. adults in that sample.

Table 4.1. Sociodemographic Characteristics of Sample

Demographic Characteristics	Percentages
Gender	
Female	57%
Male	43%
Race/Ethnicity	
Black, non-Hispanic	9%
white, non-Hispanic	73%
Other races/ethnicities, non-Hispanic	11%
Hispanic	8%
Age[a]	
18 – 24 years old	10%
25 – 34 years old	17%
35 – 44 years old	18%
45 – 54 years old	15%
55 – 64 years old	17%
65 – 74 years old	23%
Highest Education Level	
No high school diploma	4%
High school diploma/GED	22%
Some college/Associate's degree	27%
Bachelor's degree or higher	47%
Household Income	
$0 - $30,000	27%
$30,000 - $59,999	24%
$60,000 - $84,999	14%
$85,000 - $124,999	19%
$125,000 or more	17%
Political Orientation[b]	
Extremely liberal	11%
Liberal	15%
Somewhat Liberal	11%
Moderate	34%
Somewhat conservative	7%
Conservative	13%
Extremely conservative	10%
Residential Area	
Large city	27%
Suburb near large city	40%
Small city of town	21%
Rural area	12%

Note. N = 606. Values may not add up to 100% due to rounding. [a] M = 47.38 years old (SD = 16.07). [b] M = 3.89 (SD = 1.76).

response option for items that were presented on the same page (i.e., if they straight-lined). Lastly, for this main analysis, participants were excluded if they were in the control condition. Applying these criteria left a final analytic sample of $N = 606$ participants. Table 4.1 displays descriptive statistics for the demographic characteristics of this analytic sample.

Study Procedure

In this between-subjects experiment, the sociodemographic characteristics of a hypothetical amotivated student were varied between five conditions. At the start of the study, participants were asked to imagine that they were a full-time, core subject (e.g., math, science, English, or social studies) teacher in a U.S. public high school. Participants were told that they would read a brief story about a high school student and were asked to imagine that the student in the story was one of the students in their imaginary class. They were then asked to indicate what they would be most likely to do in the situation described in the brief story. The vignette they read is presented below:

You have a class of about 25 students. You have just given your students instructions to complete an assignment independently at their desks. You look around and you see that some students are working hard. Some students have their hands raised, and you quickly stand up to go speak with them.

[PICTURE MANIPULATION]

Just then, you notice one student – [FULL NAME MANIPULATION] – who looks disengaged from the assignment. [FIRST NAME] [FAMILY/ NEIGHBORHOOD SES MANIPULATION]. He is leaning his head in the palm of his hand and tapping his finger on the desk. He is not doing the assigned activity. As you approach [FIRST NAME], you hear him say: “I don’t want to do this anymore. How is this relevant? I don’t see the point.” You only have a moment to speak to him in private before moving on to speak with the

other students. What would you say to motivate [FIRST NAME] to re-engage in the assignment?

In the *low-SES-and-Black* condition, the vignette was accompanied by a small photo of a teenaged Black male; the student's full name was "Deshaun Washington" and his SES was characterized in the following way: "Deshaun is from a poor family and lives in a low-income neighborhood". In the *high-SES-and-Black* condition, the vignette was also accompanied by a small photo of a teenaged Black male; however, the student's full name was "Darius Washington", and his SES was characterized in the following way: "Darius is from a moderately wealthy family and lives in a high-income neighborhood". In the *low-SES-and-white* condition, the vignette was accompanied by a small photo of a teenaged white male; the student's full name was "Kody Meyer" and his SES was characterized in a similar way to the *low-SES-and-Black* condition. Likewise, in the *high-SES-and-white* condition, the vignette was also accompanied by a small photo of a teenaged white male; however, the student's full name was "Ethan Meyer", and his SES was characterized in a way similar to the high-SES-and-Black condition. Finally, in the *control* condition (which was ultimately excluded from main analyses), no photo was shown, the student's full name was "Irvin Mosley" and his SES was characterized in the following way: "Irvin is from a middle-class family and lives in a middle-income neighborhood".

The photos of the target student were generated through artificial intelligence and obtained from the website Generated Photos (Generated Photos, n.d.b, n.d.a). Selection of the students' names were guided by research on how perceptions of a target person's race and SES varies with the target's first and last name (Barlow & Lahey, 2018; Gaddis, 2017).

After participants read the vignette, they were asked to complete several measures of rationale provision, explicit bias, doubt about inner motivational potential, and concern

for lower-level need fulfillment, as well as several manipulation checks. At the end of the survey, participants were asked to report their demographic characteristics, including their gender, age, race/ethnicity, education, income, interracial neighborhood contact, and political ideology (i.e. liberal or conservative).

This study was embedded within the first half of a larger online survey that also contained a second study on an unrelated topic. The median completion time for the entire survey was 11.5 minutes. Participants' compensation for completing the survey was provided by Dynata in the form of reward points.

Measures

Dependent Variables

Provision of Rationales. The two primary outcomes of this study were provision of autonomy-supportive rationales and provision of controlling rationales. After reading the vignette, participants were shown several statements and asked to rate how likely they would be to say each statement to the target student in order to try to motivate him to re-engage with the assignment (assessed on a five-point Likert scale, where 1 = *extremely likely* and 5 = *not at all likely*). Three of the statements contained a controlling rationale for re-engaging:

- "You really need to do your schoolwork if you want to be able to get a good job and make a lot of money one day",
- "Your family is counting on you to do well in school so you can get a good job that helps to support them", and
- "You have to do the assignment or else you won't get the points that you need in order to pass the class."

A composite measure of provision of controlling rationales was created by, first, reverse coding each item so that higher values indicate greater likelihood of making that statement, and then taking the average of the three items (α = .80). Higher values on this composite variable indicate greater likelihood of offering the target student a controlling rationale for re-engaging with the assignment.

Additionally, three statements that participants rated themselves against contained an autonomy-supportive rationale for re-engaging:

- "I'm glad you said something. This assignment actually relates to a couple things you're interested in",
- "I understand that it may not seem like it, but assignments like this one could teach you skills that you could use to help people one day",
- "Doing assignments like this one can help you to build skills that you could use in a job that you love one day."

A composite measure of provision of autonomy-supportive rationales was created by, first, reverse coding each item so that higher values indicate greater likelihood of making that statement, and then taking the average of the three items (α = .77). Higher values on this composite variable indicate greater likelihood of offering the target student an autonomy-supportive rationale for re-engaging with the assignment.

Mechanistic Variables

Focus on Lower-Level Need Support. Participants were asked to rate their agreement with each of six statements representing general reasons why they may have rated the different rationales in the way that they did, on a six-point Likert scale (where 1 = *strongly agree* and 6 = *strongly disagree*). Three of these statements measured a belief

that the target student is and ought to be most concerned with being able to meet his lower-level needs in life (e.g., food, stability, security):

- "[FIRST NAME] is probably more worried about basic things like food and safety than he is about having a meaningful life",
- "It would probably be too stressful if a teacher made [FIRST NAME] think about having a meaningful life on top of everything else he already has to deal with"
- "[FIRST NAME]'s world is harsh and unforgiving, so he should focus on working hard and doing what is expected of him if he wants to survive."

A composite measure of perception of lower-level need focus was created from the first three items by, first, reverse coding each item so that higher values indicate greater agreement with each statement, and then taking the average of these three items (α = .75). Higher values on this composite variable indicate stronger beliefs that this student is and ought to be more focused on lower-level need fulfillment.

Additionally, one statement against which participants rated themselves measured whether they thought it most important to help support the amotivated student in meeting his lower-level need for financial stability (i.e., "My main goal in talking to [FIRST NAME] would be to get him to not fail his classes so he can make enough money in the future"). This item was reverse-coded such that higher values indicate greater agreement with supporting the student's lower-level needs.

Lastly, two statements measured whether participants thought it most important to support the amotivated student in meeting his higher-level needs (e.g., personal freedom, self-actualization):

- "My main goal in talking to [FIRST NAME] would be to help him look forward to learning from assignments like this one" and

- "My main goal would be to inspire [FIRST NAME] to pursue his interests, achieve his dreams, and live a meaningful life."

A composite measure of emphasis on higher-level need support was created from these two items by, first, reverse coding each item so that higher values indicate greater agreement with each statement, and then taking the average of the items (r = .48). Higher values on this composite variable indicate stronger beliefs in the importance of helping the target student satisfy his higher-level needs.

Explicit Bias. Explicit bias, operationalized as reporting negative feelings toward the target student, was measured via two items. The first item asked participants to report how they would feel about the student if they were his teacher, on a 9-point scale (where 1 = *Extremely warm and favorable* and 9 = *Extremely cold and unfavorable*). The second item asked participants to report how much they would like the student if they were his teacher, on a 7-point scale (where 1 = *Like them a lot* and 7 = *Dislike them a lot*). Higher values on either of these two items indicate greater explicit bias against the target student.

Doubt about Inner Motivational Potential. Participants read several statements representing different reasons why the target student may be motivated to work hard on assignments and were asked to rate how likely they think it is that each reason is his primary reason for working hard (assessed on a five-point Likert scale, where 1 = *extremely likely* and 5 = *not at all likely*). Three of these statements represented a judgment that the student primarily worked hard for controlled reasons:

- "it is mainly because other people make him",
- "it is mainly because he is afraid of failing or getting in trouble", and
- "it is mainly because he would feel bad about himself if he didn't."

A composite measure of judgment of controlled motivation was created by, first, reverse coding each item so that higher values indicate stronger perceived likelihood, and then

taking the average of these three items (α = .76). Higher values on this composite variable indicate stronger judgments that the target student is externally motivated to work hard on assignments.

Additionally, three of statements represented a judgment that the student primarily worked hard for autonomous reasons:

- "it is mainly because it is personally important to him to do a good job in school",
- "it is mainly because he thinks the course material is useful to learn", and
- "it is mainly because he enjoys what he is learning."

A composite measure of judgment of autonomous motivation was created by, first, reverse coding each item so that higher values indicate stronger perceived likelihood, and then taking the average of these three items (α = .65). Higher values on this composite variable indicate stronger judgments that the target student is internally motivated to work hard on assignments.

Lastly, on a separate screen, participants read four statements about the motivational potential of the target student and were asked to rate their agreement with each statement on a six-point Likert scale (where 1 = *strongly agree* and 6 = *strongly disagree*):

- "There's very little I could say or do to motivate [FIRST NAME] to truly want to learn and work hard in school",
- "Even small things that I say or do can make a huge difference in how much [FIRST NAME] is interested in learning and working hard in school",
- "[FIRST NAME] lacks the ability, work ethic, and values necessary to learn and work hard in school", and
- "It's unlikely that [FIRST NAME] will ever truly enjoy learning and working hard in school."

A composite measure of perceived capacity for internal motivation was created by, first, reverse coding the three negatively worded items so that higher values indicate stronger judgments of low capacity for internal motivation, and then taking the average of the four items ($\alpha = .77$). Higher values on this composite variable indicate stronger doubts that the target student could ever truly want to learn and work hard in school.

Manipulation Checks

Participants completed several measures of their perceptions of the characteristics of the target student. These measures included: an item assessing the race of the student (1 = *white*, 2 = *Black or African American*, 3 = *Other*), an item assessing perceptions of how likely it is that the student's family struggles financially (where 1 = *Extremely likely* to 5 = *not at all likely*), an item assessing perceptions of the type of area where the student lives in (1 = *inner city area*, 2 = *rural area*, 3 = *suburban area*), an item assessing perceptions of the student's motivation level (where 1 = *Extremely high* to 5 = *extremely low*), and an item assessing the age of the student in years.

Analytic Procedure

All analyses were conducted in R (R Core Team, 2020) and the inference criterion was $p < .05$, two-tailed.

Preliminary Analyses

Chi-square tests were run to check whether participants differed between the four main conditions in their perception of the student's race and, separately, their guesses about the type of area where the student resides. Additionally, a regression model was used to check whether participants differed in their ratings of how likely it is that the student's family struggles financially.

Primary Analyses

First, two regression models examined whether participants' provision of controlling rationales and, separately, provision of autonomy-supportive rationales differed between the four main conditions. The equation for each model is shown below:

$$Y = \alpha_1 + \beta_1 D_1 + \beta_2 D_2 + \beta_3 D_3 + e \quad (1)$$

where Y is the rationale provision composite, D_1 is a binary indicator of being in the Black&lowSES condition, D_2 is a binary indicator of being in the white&lowSES condition, D_3 is a binary indicator of being in the Black&highSES condition, α_1 is the average value of the rationale provision composite in the white&highSES condition, β_1 is the effect of being in the Black&lowSES condition vs. the white&highSES condition, β_2 is the effect of being in the white&lowSES condition vs. the white&highSES condition, and β_3 is the effect of being in the Black&highSES condition vs. the white&highSES condition.

Then, for each of the psychological mediator variables, a regression analysis was used to examine whether participants' ratings on these measures varied between the four conditions. These models used a similar equation to that shown in Equation 1. Finally, correlational analyses were performed to test the correlations between the rationale provision indices and the mechanistic variables.

RESULTS

Preliminary Analyses

Descriptive Statistics

Table 4.2 displays descriptive statistics for the outcomes and mechanistic variables across condition. On average, participants were only somewhat to moderately likely to offer the amotivated student a controlling rationale for engaging in the assignment, and they were moderately to very likely to offer the student an autonomous rationale.

Table 4.2. Descriptive Statistics for Outcome Variables and Mechanistic Variables

Variable	*M (SD)*
Outcomes	
Rationale provision - controlling[a]	2.52 (1.21)
Rationale provision - autonomy-supportive[a]	3.58 (.94)
Mechanisms	
Need support focus - lower-level[a]	3.59 (1.29)
Need support focus - lower-level - financial stability	3.75 (1.52)
Need support focus – higher level[a]	4.75 (.99)
Explicit bias - coldness	3.20 (1.68)
Explicit bias - disliking	2.57 (1.39)
Perceived motivation - controlled[a]	2.75 (1.03)
Perceived motivation - autonomous[a]	3.48 (.87)
Doubt about inner motivational potential[a]	2.90 (1.40)

Note. $N = 606$. [a]Composite variable.

Participants, on average, were somewhat ambivalent about how much the amotivated student is focused on and should receive support for meeting lower-level needs in life; however, they agreed that helping the student satisfy their higher-level needs would be one of their primary goals. On average, participants reported having somewhat warm feelings toward the amotivated student and liking him to some degree. Participants judged on average that it was somewhat to moderately likely that the student had both controlled motivation and autonomous motivation for working hard in school. Lastly, participants mostly disagreed, on average, that the student lacked the potential to be internally motivated to learn and work hard in school. Overall, these results suggested that participants had largely middling opinions of the amotivated student across conditions, and the primary analysis would soon determine the degree to which their opinions differed between the four main conditions.

Table 4.3. Balance Achieved on Sociodemographic Covariates

	Condition				*p*-value	Standardized Mean Difference
	High SES & white	High SES & Black	Low SES & white	Low SES & Black		
N	152	160	147	147		
(%)	(25%)	(26%)	(24%)	(24%)		
Gender (%)					.51[a]	.14
Female	53.3	57.8	58.7	57.6		
Male	46.7	40.9	41.3	41.0		
Race/Ethnicity (%)					.10[a]	.25[c]
Black, non-Hispanic	7.9	8.4	9.4	8.7		
white, non-Hispanic	77.0	74.7	75.4	63.8		
Other, non-Hispanic	11.2	8.4	6.5	16.7		
Hispanic	3.9	8.4	8.7	10.9		
Age (*M* (*SD*))	47.86 (16.33)	46.99 (15.72)	48.34 (15.79)	46.35 (16.54)	.74[b]	.07
Highest Ed Level (%)					.75[a]	.16[c]
No high school diploma	2.6	3.2	5.8	5.0		
High school diploma/GED	23.2	22.1	23.9	17.3		
Some college/Associate's degree	27.8	29.2	26.8	25.2		
Bachelor's degree or higher	46.4	45.5	43.5	52.5		
Household Income (%)					.66[a]	.20[c]
$0 - $30,000	25.8	26.6	26.3	29.7		
$30,000 - $59,999	25.2	23.4	25.5	20.3		
$60,000 - $84,999	9.3	17.5	13.1	15.9		
$85,000 - $124,999	23.8	17.5	16.8	15.9		
$125,000 or more	15.9	14.9	18.2	18.1		
Political Orientation (%)					.21[a]	.33[c]
Extremely liberal	11.3	14.3	6.6	9.4		
Liberal	17.9	14.9	11.7	15.2		
Somewhat Liberal	11.3	9.7	9.5	13.8		
Moderate	27.2	34.4	35.0	39.9		
Somewhat conservative	6.0	7.1	8.0	8.0		
Conservative	13.2	11.0	16.8	9.4		
Extremely conservative	13.2	8.4	12.4	4.3		
Residential Area (%)					.89[a]	.14[c]
Large city	27.0	27.9	25.4	25.9		
Suburb near large city	36.2	40.3	39.1	44.6		
Small city of town	24.3	22.1	21.7	17.3		
Rural area	12.5	9.7	13.8	12.2		

Note. $N = 606$. [a] *p*-value obtained from Pearson's chi-square test. [b] *p*-value obtained from one-sample t-test that assumes equal variances between groups. [c] Value represents the average of all possible standardized mean differences between categories.

Condition Balance Testing

Table 4.3 displays statistics from balance tests that were performed to assess the performance of the random assignment mechanism. Results indicated that participants did not differ significantly between the four main conditions on any of the measured demographics. Thus, it was appropriate to test the causal effect of the sociodemographic background manipulation without needing to control for participant demographics.

Manipulation Checks

Tests were performed to investigate the effect of the sociodemographic background manipulation on the manipulation check variables. As expected, a chi-squared test indicated that participants differed significantly between conditions in their perceptions of the target student's race, $X^2(6) = 349.71$, $p < .001$, with 83% of participants in the low-SES & Black condition and 82% of those in the high-SES & Black condition guess that the target student was Black, and with 68% of participants in the low-SES & white condition and 86% of those in the high-SES & white condition guess that the target student was white. Interestingly, 20% of participants in the low-SES & white condition guessed that the target student might be from some other racial group, with nearly one third reporting a belief that the student might be Hispanic/Latinx.

A chi-squared test also showed that, as expected, there were condition differences in participants' guesses about the type of area that the target student resides in, $X^2(6) = 178.97$, $p < .001$. Specifically, 72% of participants in the low-SES & Black condition and 62% of participants in the low-SES & white condition guessed that the student lives in an inner-city area; 68% of participants in the high-SES & Black condition and 70% of participants in the high-SES & white condition guessed that the student lives in a suburban area, and 68% of participants in the low-SES & white condition and 86% of those in the

high-SES & white condition guess that the target student was white. About 22% of participants in the low-SES & white condition guessed that the student lives in a rural area.

As expected, a simple regression analysis found that participants in either low-SES condition rated the target student's family as significantly more likely to struggle financially than did participants in either higher-SES condition, $F(3, 579) = 97.66$, $p < .001$. Simple regressions also showed that participants did not differ by condition in their perceptions of the target student's current motivation level, $F(3, 581) = .99$, *n.s.*, nor did they differ significantly by condition in the perceptions of the target student's age, $F(3, 468) = 1.16$, *n.s*. Together, the results of these tests suggest that the sociodemographic background manipulation was indeed effective at manipulating participants' judgments of the target student's race and SES, without also altering their perceptions of other background characteristics that could influence responding to the outcome and mechanistic variables.

Primary Analyses

Effect of Condition on Rationale Provision

Table 4.4 displays the results of simple regressions that were run to test the effect that the sociodemographic background manipulation had on the tendency to provide certain types of rationales to the amotivated student. The results shown in the first column indicate that, contrary to expectations, sociodemographic condition did not explain significant variation in the provision of autonomy-supportive rationales, $F(3, 590) = .52$, $p = .67$.

Results shown in the second column of Table 4.4 indicate that sociodemographic condition did explain a significant portion of the variance in provision of controlling rationales, $F(3, 591) = 2.56$, $p = .054$, $\eta^2 = .01$ [.00, .03]. Contrary to expectations, the inclination to offer controlling rationales was highest in both the low-SES & Black

Table 4.4. Effect of Sociodemographic Background Condition on Rationale Provision

	Autonomy-Supportive Rationale Provision Composite[a]		Controlling Rationale Provision Composite[b]	
Terms	*b (SE)*	*p*	*b (SE)*	*p*
Intercept	3.59 (.08)	< .001	2.66 (.10)	< .001
High-SES & Black	.05 (.11)	.66	-.25 (.14)	.07
Low-SES & Black	-.03 (.11)	.78	-.01 (.14)	.96
Low-SES & white	-.09 (.11)	.44	-.30 (.14)	.03

Note. Reference group is the high-SES & white condition. [a]*N* = 594. [b]*N* = 595.

condition (*M* = 2.66) and the high-SES & white condition (*M* = 2.66), whose means did not differ significantly from each other. Furthermore, participants in the high-SES & white condition were significantly more likely to offer the student controlling rationales than participants in the low-SES & white condition (*M* = 2.36), and marginally more likely to offer controlling rationales than participants in the high-SES & Black condition (*M* = 2.41). In support of the hypothesized effect, participants in the low-SES & Black condition were significantly more likely on average to offer the target student controlling rationales than those in the low-SES & white condition, *b* = -.29, *SE* = .14, *p* = .04, and marginally more likely than those in the high-SES & Black condition, *b* = -.25, *SE* = .14, *p* = .08. Finally, unexpectedly, participants in the high-SES & Black condition did not differ from those in the low-SES & white condition in their likelihood of providing controlling rationales, *b* = -.05, *SE* = .14, *p* = .73.

Effect of Condition on Psychological Mechanisms

Need Level Focus. Table 4.5 displays the results of simple regressions that were run to test the effect that the sociodemographic background manipulation had on need support focus.

Table 4.5. Effect of Sociodemographic Background Condition on Level of Need Focus

	Belief in Lower-Level Need Focus Composite		Emphasis on Lower-Level Need Support: Financial Stability		Emphasis on Higher-Level Need Support Composite	
Terms	*b(SE)*	*p*	*b(SE)*	*p*	*b(SE)*	*p*
Intercept	3.16 (.10)	< .001	3.68 (.12)	< .001	4.75 (.08)	< .001
High-SES & Black	.14 (.14)	.31	-.00 (.17)	.99	.08 (.11)	.49
Low-SES & Black	.82 (.14)	< .001	.20 (.18)	.25	.04 (.11)	.71
Low-SES & white	.83 (.15)	< .001	.08 (.18)	.64	-.11 (.12)	.33

Note. Reference group is the high-SES & white condition. $N = 590$.

Results in the first column indicate that sociodemographic condition explained a significant portion of the variance in participants' beliefs that the student is and should be primarily focused on satisfying his lower-level needs in life, $F(3, 586) = 18.6$, $p < .001$, $\eta^2 = .09$ [.05, .12]. In support of the hypothesized effect, participants in both the high-SES & white condition ($M = 3.16$) and the high-SES & Black conditions ($M = 3.30$) on average reported the weakest beliefs that meeting lower-level needs is important for the target student, and mean values did not differ significantly between these groups. Additionally, as expected, participants in the high-SES & white condition reported significantly weaker beliefs in the importance of the student meeting his lower-level needs than participants in either the low-SES & Black condition ($M = 3.98$), or the low-SES & white condition ($M = 3.99$), which did not differ significantly from each other, $b = -.01$, $SE = .15$, $p = .92$. Likewise, as expected, participants in the high-SES & Black condition reported significantly weaker beliefs in the importance of the student meeting lower-level needs than participants in either the low-SES & Black condition, $b = .68$, $SE = .14$, $p < .001$, or the low-SES & white condition, $b = .69$, $SE = .14$, $p < .001$.

Table 4.6. Effect of Sociodemographic Background Condition on Explicit Bias Against the Amotivated Student

	Coldness[a]		Disliking[b]	
Terms	*b(SE)*	*p*	*b(SE)*	*p*
Intercept	3.69 (.13)	< .001	2.97 (.11)	< .001
High-SES & Black	-.36 (.19)	.057	-.43 (.16)	.006
Low-SES & Black	-.87 (.19)	< .001	-.66 (.16)	< .001
Low-SES & white	-.79 (.19)	< .001	-.56 (.16)	< .001

Note. Reference group is the high-SES & white condition. [a]$N = 584$. [b]$N = 586$.

Surprisingly, results in the second column of Table 4.5 show that sociodemographic condition did not explain significant variation in reported beliefs in the importance of helping the student do well in school for the sake of making money in the future, $F(3, 586) = .60$, $p = .62$. Additionally, the third column shows that sociodemographic condition did not explain significant variation in participants' beliefs in the importance of supporting the student's higher-level needs, $F(3, 586) = 1.02$, $p = .38$.

Explicit Bias. Table 4.6 displays the results of simple regressions that were run to test the effect that the sociodemographic background manipulation had on explicit bias against the amotivated student. Results in the first column indicated that sociodemographic condition explained a significant portion of the variance in feelings of coldness toward the student, $F(3, 580) = 8.63$, $p < .001$, $\eta^2 = .04$ [.02, .07]. However, contrary to expectations, participants' feelings toward the student were significantly colder in the high-SES & white condition ($M = 3.69$) than they were in either the low-SES & Black condition ($M = 2.82$), or the low-SES & white condition ($M = 2.90$), which did not differ significantly from each other, $b = .08$, $SE = .20$, $p = .70$. Participants in the high-SES & white condition also reported marginally colder feelings toward the target student than those in the high-SES & Black condition ($M = 3.33$). Contrary to expectations, participants in the high-SES & Black

Table 4.7. Effect of Sociodemographic Background Condition on Doubt about Student's Inner Motivational Potential

	Perceived Controlled Motivation Composite[a]		Perceived Autonomous Motivation Composite[b]		Doubt about Inner Motivational Potential Composite[c]	
Terms	*b(SE)*	*p*	*b(SE)*	*p*	*b(SE)*	*p*
Intercept	2.77 (.08)	< .001	3.41 (.07)	< .001	3.03 (.11)	< .001
High-SES & Black	-.14 (.12)	.25	.13 (.10)	.21	-.15 (.16)	.34
Low-SES & Black	.06 (.12)	.65	.09 (.10)	.38	-.17 (.16)	.30
Low-SES & white	-.03 (.12)	.82	.04 (.10)	.67	.18 (.16)	.26

Note. Reference group is the high-SES & white condition. [a]$N = 587$. [b]$N = 587$. [c]$N = 586$.

condition felt more coldly toward the target student than participants in either the low-SES & Black condition, $b = -.51$, $SE = .19$, $p = .009$, or the low-SES & white condition, $b = -.43$, $SE = .19$, $p = .03$.

Results in the second column of Table 4.6 show that sociodemographic condition also explained significant variation in dislike toward the student, $F(3, 582) = 6.68$, $p < .001$, $\eta^2 = .03$ [.01, .06]. Contrary to expectations, participants disliked the student significantly more in the high-SES & white condition ($M = 2.97$) than in either the low-SES & Black condition ($M = 2.31$), or the low-SES & white condition ($M = 2.41$), which did not differ significantly from each other, $b = .10$, $SE = .16$, $p = .55$. Participants in the high-SES & white condition also disliked the target student significantly more than those in the high-SES & Black condition ($M = 2.54$). Lastly, participants in the high-SES & Black condition did not differ from either the low- SES & Black condition, $b = -.23$, $SE = .16$, $p = .15$, or the low-SES & white condition, $b = -.13$, $SE = .16$, $p = .41$, in how much they disliked the target student.

Table 4.8. Correlations between Outcome Variables and Mechanistic Variables

Variable	1	2	3	4	5	6	7	8	9
1. Rationale provision - controlling[a]	--								
2. Rationale provision - autonomy-supportive[a]	.40***	--							
3. Need focus - lower-level[a]	.45***	.25***	--						
4. Need support – lower level	.58***	.35***	.47***	--					
5. Need support– higher level[a]	.14***	.51***	.20***	.26***	--				
6. Explicit bias – coldness	-.20***	-.36***	-.36***	-.30***	-.38***	--			
7. Explicit bias - disliking	-.13***	-.26***	-.28***	-.23***	-.34***	.65***	--		
8. Perceived motivation - controlled[a]	.60***	.38***	.48***	.47***	.18***	-.29***	-.23***	--	
9. Perceived motivation - autonomous[a]	.26***	.44***	.24***	.22***	.42***	-.43***	-.35***	.31***	--
10. Doubt about inner motivational potential[a]	.56***	.15***	.40***	.38***	-.06	-.09*	-.01	.58***	.11***

Note. *** $p < .001$; ** $p < .01$; * $p < .05$; $^{+}$ $p < .10$. [a]Composite variable.

Doubt about Inner Motivational Potential. Table 4.7 displays the results of simple regressions that were run to test the effect of the sociodemographic background manipulation had on participants' beliefs about the student's motivation and inner motivational potential. The results indicated that, contrary to expectations, sociodemographic condition did not explain significant variation in perceptions of controlled motivation to work hard in school (column 1), $F(3, 583) = .91$, $p = .44$, nor in perceptions of autonomous motivation (column 2), $F(3, 583) = .60$, $p = .62$. Sociodemographic condition also did not explain significant variation in beliefs about the target student's potential to be internally motivated in school, $F(3, 582) = .55$, $p = .65$.

Relationships between Rationale Provision and Psychological Mechanisms

Table 4.8 displays the correlations between the rationale provision composites and the mechanistic variables. As expected, likelihood of providing controlling rationales was positively correlated with belief in lower-level need focus, perception of controlled motivation, and doubt about inner motivational potential. However, contrary to expectations, likelihood of providing controlling rationales was positively correlated with both emphasis on higher-level need support and perception of autonomous motivation; it was also negatively correlated with explicit bias.

Similarly, and contrary to expectations, likelihood of providing autonomy-supportive rationales was also positively correlated with belief in lower-level need focus, perception of controlled motivation, and doubt about inner motivational potential. However, as expected, likelihood of providing autonomy-supportive rationales was also negatively correlated with explicit bias and positively correlated with both emphasis on higher-level need support and perception of autonomous motivation.

DISCUSSION

Overall, this novel study provides mixed evidence in support of the hypothesis that U.S. adults might provide unequal autonomy support to situationally amotivated students from different racial and socioeconomic backgrounds. As expected, student race and student SES had an interactive effect, such that participants were more likely to offer controlling rationales for engaging in class assignments to a low-SES & Black student than they were to either a high-SES & Black student or a low-SES & white student. One surprising finding from this study was that provision of controlling rationales did not differ between the low-SES & Black condition and the high-SES and white condition. Such a finding might have been expected given that past research has shown that wealthy individuals are stereotyped in the U.S. as being highly competitive and concerned with maintaining power and status (Fiske et al., 2002), attitudes which may have led the U.S. adults in this study to judge that a high-SES and white student might be as externally motivated (e.g., by the prospect of social mobility, avoidance of low grades, and family pressure to succeed; see Labaree, 1997) as the low-SES and Black student was judged to be. Another surprising finding from this study was that, unlike the previous two studies, provision of autonomy-supportive rationales did not differ by student sociodemographic background, suggesting that, when not forced to rank rationale types or nominate just one, U.S. adults judge that autonomy-supportive rationales would be effective at motivating students from any racial and socioeconomic background to engage in learning.

This novel study also provides mixed evidence in support of some of the hypothesized mechanisms through which student race and student SES might impact rationale provision. As expected, U.S. adults in the two low-SES conditions (regardless of student race) reported stronger beliefs that the student is and should be more concerned with meeting his lower-level needs for food and security in life, which in turn was

positively associated with offering him controlling rationales for engaging in classwork. This pattern of findings suggests that the negative effect that student SES had on provision of controlling rationales within the two *Black* conditions was mediated by U.S. adults perceiving weaker focus on lower-level need fulfillment from the high-SES & Black student. It also suggests that the positive effect of SES on provision of controlling rationales within the two *white* conditions cannot be explained by the negative effect of SES on perceptions of lower-level need focus.

One surprising finding from the investigation of potential mechanisms was that race had no main effect on explicit bias against the target student, but instead seemed to interact with SES such that participants reported greater dislike and coldness towards the high-SES and white student. Past research has shown that U.S. adults typically report considerably stronger feelings of contempt toward people who are experiencing poverty (regardless of racial background) (Fiske et al., 2002). Yet, U.S. adults also report strong feelings of envy of people in higher-SES groups (Fiske, 2010). Why the explicit bias measures used in this study seemed to capture feelings of envious prejudice more than contemptuous prejudice is unclear. One alternative supposition is that the economic and social upheaval that took place within the U.S. cultural context in 2020 following the onset of the COVID-19 pandemic and the murder of George Floyd altered U.S. adults' race- and social class-related attitudes, such that they either felt or became less willing to report contemptuous prejudice toward low-SES students and Black students, and perhaps more willing to report contemptuous prejudice toward a high-SES and white student. Whatever the cause of these unexpected patterns may be, explicit bias toward the target student was negatively related to provision of controlling rationales, suggesting that explicit bias did not mediate the effect that being a high-SES & white student had on this outcome in this study.

Finally, it is worth discussing that this study found no evidence that student race and SES impacted U.S. adults' beliefs about the inner motivational potential of the target student. This finding was unexpected given that past research has shown that, within the U.S., Black people and low-SES people are consistently stereotyped as lazy and not valuing of education (DeCastro-Ambrosetti & Cho, 2005; Gorski, 2012; Puchner & Markowitz, 2015; cf. Harper & Davis III, 2012; Marchand et al., 2019). Together, these attitudes should have contributed to a judgment that low-SES students and Black students are more externally motivated and less internally motivated to engage in schoolwork, or even that they lack the inner resources to support interest and engagement in school. One reason why this pattern may not have emerged in this study is perhaps due to social desirability concerns (as was discussed above): because of the cultural climate, U.S. adults might have genuinely felt or been motivated to report more positive perceptions of a low-SES or Black student, and more negative perceptions of an a high-SES or white student, thus eliminating condition differences.

Overall, the findings of this study suggest that race and SES bias in controlling rationale provision may be partly driven by U.S. adults' belief that low-SES and Black students are more concerned than their high-SES counterparts with meeting their lower-level needs in life, which in turn leads U.S. adults to offer low-SES and Black students more controlling reasons to engage in classwork. The surprising patterns that emerged in this study also suggest the need for a replication that addresses some of its limitations.

Limitations & Future Directions

One limitation of the present study is that it measured rationale provision using a Likert scale format. There was an unexpected, moderate positive correlation between the two rationale provision composites, suggesting that participants did not differentiate well

between the controlling and autonomy-supportive items when rating their likelihood of offering each rationale (a form of survey satisficing; Vannette & Krosnick, 2014). The fact that the controlling items were presented on a separate screen from the autonomy-supportive items may have limited participants' ability to pick up on key thematic differences in the content of these rationales (an issue which did not emerge, for example, on the perceived motivation items, which were all displayed on the same screen). It is also possible that participants grew bored with rating so many items on the same scale, leading to less differentiation even among the autonomy-supportive items (which were presented last in the set) and therefore less variation for the sociodemographic background manipulation to explain. Future studies should consider measuring rationale provision through alternative formats that a) facilitate or encourage differentiation between different rationales (e.g., by listing items on the same page; by using the ranking format from Study 1), or b) that let the work of rationale differentiation fall on the researcher (e.g., by using the open-ended format from Study 2). This would also allow for a test of whether the effects of the previous studies could be directly replicated in a new sample, with a new but conceptually similar manipulation.

Related to the issue of survey satisficing, an additional limitation of this study is that it was conducted in a non-probability sample of non-teachers. Participants' primary incentive to opt into the survey was to earn rewards points from Dynata; additionally, as laypeople, they may have felt limited accountability for (or ability to) provide accurate data on how they would view and respond to an amotivated student in a classroom setting. As a result, the data obtained from this sample may be lower in quality than what would be obtained from a probability sample of teaching professionals. One possible way to enhance non-teacher participants' motivation to provide accurate responses could be to refrain from asking them to pretend they are teachers and, instead, ask them to provide their opinion as

a mentor to the student seeking a rationale. Nevertheless, efforts should still be made to replicate this study in a probability sample of U.S. teachers since they, as professionals, might be more motivated to respond with care to a survey in their direct line of work, even if they are also motivated to work quickly. Conducting this study in a teacher sample would also allow for an interesting test of whether the effect of being high-SES & white that was observed in this sample would replicate in a sample that is almost universally college-educated, as most U.S. teachers are (Goldring et al., 2013).

Chapter 5: General Discussion

The primary goal of this dissertation was to investigate whether and why there might be race and social class disparities in U.S. teachers' provision of autonomy support via their stated rationales for engaging in class assignments. Across three novel studies conducted in national samples, this dissertation tested the causal and correlational effects of student race and SES on participants' likelihood of offering autonomy-supportive (vs. controlling) rationales to a situationally amotivated student. Overall, these studies provided mixed evidence in support of the hypothesis that U.S teachers and adults are less likely to offer autonomy-supportive rationales, and more likely to offer controlling rationales, to a student who is low-SES & Black (vs. high-SES & white). The third study also investigated the potential mechanisms through which student race and SES might affect rationale provision, finding some evidence in support of the mechanism of focus on the student's lower-level needs.

Study 1 laid the foundation for Studies 2 and 3 by establishing the methodological paradigm of a vignette about a hypothetical student seeking a motive for engaging from their teacher, which was highly effective at a) priming participants to imagine how they could best motivate the target student and b) manipulating the student's race and SES. Study 1 found in a nationally-representative sample of N = 2026 U.S adults that the race and SES of a target student had joint causal impact on participants' ranking of researcher-generated rationales, with participants in the low-SES & Black condition being less likely to rank an autonomy-supportive rationale (and thus more likely to rank a controlling rationale) as their first choice for motivating the student than participants in the high-SES & white condition (Cohen's h = .22). Study 2, a correlational study, aimed to improve upon

Study 1 in terms of both the ecological validity of the measures and the relevance of the sample. Results obtained from a nationally-representative sample of $N = 255$ U.S. 9th-grade math teachers showed that the participants who were linked to a larger proportion of Black students relative to white students were less likely to self-generate autonomy-supportive rationales to be offered to a hypothetical student in their math class. This relationship held after controlling for student SES, which itself had an uninterpretable curvilinear relationship with autonomy-supportive rationale provision.

Finally, Study 3 conceptually replicated the methods of Study 1; it allowed for a test of the independent causal effects that student race and SES have on continuous measures of rationale provision, with some rationales adapted from those used in Study 1 and others adapted from teachers' self-generated responses in Study 2. Study 3 found in a national sample of $N = 606$ U.S. adults that student race and SES had no effect on participants' self-reported likelihood of offering the target student an autonomy-supportive rationale. However, these factors did interact to predict their provision of controlling rationales, with participants in the low-SES & Black condition being more likely than those in both the low-SES & white condition and the high-SES & Black condition (but not the high-SES & white condition) to offer the student a controlling rationale ($\eta^2 = .01$). Study 3 also extended Study 1 by investigating three novel mechanisms through which student race and student SES might have influenced controlling rationale provision: explicit bias against the student, doubt about the student's potential to be internally motivated in school, and being focused on the student's lower-level need fulfillment. Results indicated that participants in the two low-SES conditions reported greater beliefs that the target student is and should be more concerned with meeting his food and safety needs than his need for a meaningful life ($\eta^2 = .09$), which in turn was positively associated with provision of

controlling rationales ($r = 45$, $p < .001$) and could potentially explain the positive effect of student SES on controlling rationale provision in the two Black conditions.

IMPLICATIONS FOR THEORY, RESEARCH, AND PRACTICE

The findings from this dissertation indicate that the racially- and socioeconomically-unequal realities of the U.S. educational context – i.e., that Black and low-SES students have less access to high-quality *formal* educational resources and opportunities (Akiba et al., 2007; Flores, 2007) – filter down to the *informal* messages that teacher and adults give students about why they should engage in schoolwork. That racial and socioeconomic inequalities (Canning et al., 2019; Solomon et al., 1996) exist in U.S. teachers' motivational practices is not a novel finding. What is novel and informative is the way in which this dissertation (particularly Study 3) highlights the intersectionality (see Crenshaw, 1993) of race and SES in U.S. classrooms, such that being both Black and low-SES puts students at even greater risk of receiving low quality motivational support than does being Black alone or being low-SES alone. Interventions that aim to reduce teacher bias in autonomy-related motivational practices may therefore need to intervene on the beliefs and attitudes that teachers hold toward students who are simultaneously low-SES and Black. In a similar vein, the surprising findings from Study 3 – i.e., that a white and high-SES student was as likely to be offered controlling rationales as a low-SES and Black student was – suggest that autonomy-related practice interventions should attempt to change whatever teacher beliefs apply to high-SES and white students, not just those that apply to high-SES students alone or white students alone.

Provision of autonomy-supportive rationales was more common than provision of controlling rationales in all three studies, yet U.S. adults and teachers were more likely to withhold autonomy support from (and offer more controlling messages to) a student

characterized as low-SES & Black. Some important theorizing has already been done within the SDT framework to understand the student-level factors that might lead teachers to withhold autonomy support (e.g., being perceived to have low or external motivation; Pelletier et al., 2002; Reeve, 2009). This dissertation brings that race- and SES-neutral research into conversation with research which clearly shows that many of those same factors are believed by U.S. teachers to vary with student race and SES (e.g., Alexander et al., 1987; Solomon et al., 1996; though, curiously, Study 3 did not find evidence of this relationship). It highlights race and SES as factors that causally influence perceptions of a student's motivation, and in doing so, brings greater attention to the reality that Black and low-SES students are especially vulnerable to having their sense of autonomy thwarted by U.S. adults and teachers.

Linking SDT-based research on the predictors of motivational practice with Maslow's theory on the hierarchy of human needs, this dissertation also identifies one novel factor that makes U.S. adults more likely to use controlling practices with low-SES students (regardless of race): the belief that a low-SES student should be more concerned with meeting their lower-level needs (e.g., financial stability) than their higher-level ones (e.g., personal freedom, self-actualization). This belief is reminiscent of another belief sometimes held by U.S. teachers: the idea that students whose lower-level needs are not met at home are less capable of being meaningfully engaged in learning (Baum & McMurray-Schwarz, 2004; Patterson et al., 2016). While food, housing, and financial instability can certainly compromise students' physical and mental presence in the classroom, and while many Black students and low-SES students do endorse financial stability for themselves and for their family as one of their main motives for working hard in school (e.g., Phinney et al., 2006), the fact remains that Black students and low-SES students are at least as autonomously motivated to learn as white and high-SES students

are (e.g., Cokley, 2003) and are very likely to endorse personal development as one of their key motives for learning (Hwang et al., 2002; e.g., Phinney et al., 2006). In other words, Black students and low-SES students have simultaneous goals to fulfill both their lower-level and higher-level needs in life. One practical implication of all of this is that teachers and adults are incorrect to assume that a student struggling to have their needs for food and safety met outside of school would necessarily be either incapable of or uninterested in hearing messages about how class assignments can help them to reach their full potential in life.

The findings of this dissertation, in combination with the research on Black and low-SES students' motivations for learning, seem to beg the question of the extent to which Black students and low-SES students may be harmed by teachers and adults being less likely to offer them autonomy-supportive rationales and more likely to offer controlling rationales. There are no known studies that test whether the effect of rationale content on academic outcomes differs between Black or low-SES students and white or high-SES students. In indirect tests, prior studies have shown that students who are given a rationale with extrinsic goal content generally show worse outcomes (e.g., less autonomous motivation, more shallow learning, and weaker persistence) than students given one with intrinsic goal content, and that this effect generally is not moderated by students' own personal orientations toward pursuing goals for extrinsic (e.g., admiration) or intrinsic (e.g., contribution) reasons (Vansteenkiste et al., 2008). Such findings suggests that regardless of the different motivations that students from different racial and socioeconomic groups might have for engaging in class assignments, they might all benefit from autonomy support and suffer from controlling practices, though perhaps to varying degrees.

Additional indirect evidence that the effect of autonomy support might differ in strength (or even valence) between Black or low-SES students and white or high-SES

students comes from one study of U.S. college students which found that the positive correlation between sense of autonomy and GPA was stronger among high-SES students than among low-SES students (Guiffrida et al., 2013). The same study also found that, among white students, being motivated to attend college in order to help out one's family had a marginal negative association with reported intentions to persist through college, while this relationship did not exist among Black students. Lastly, a recent daily diary study conducted in a sample of U.S. high school students found that, among Black students (the majority of whom were eligible for free or reduced-price lunch), higher-than-average levels of controlled motivation on a given day predicted increases in autonomous motivation relative to the previous day, but among white students, greater external regulation on a given day predicted less autonomous motivation (Yates & Patall, 2021). Together, these findings suggest that Black students and low-SES students may not respond quite as negatively to controlling motivational practices as do white and high-SES students, whose motivation and engagement seems more dependent upon a sense of autonomy. Indeed, Black and low-SES students may have developed strategies for coping with relative deprivation of autonomy support as they seek to pursue their autonomous goals. More research is sorely needed in this area.

As a final thought, this dissertation found inconsistent evidence regarding the unique effects that student race and student SES have on provision of rationales. In Study 2, teacher-level student race composition and SES composition were each associated with teachers' likelihood of providing autonomy-supportive rationales, even after controlling for the effect of the other variable. This finding aligns with past research which has shown that, although race and SES are moderately correlated within the U.S. (Semega et al., 2020), a student's race still matters for other people's perceptions of their behaviors even after accounting for SES (Downey & Pribesh, 2004), and likewise, that a student's SES

still matters after accounting for race (Darley & Gross, 1983; Downey & Pribesh, 2004). Meanwhile, in Study 3, neither target student race nor SES had main effects on provision of controlling rationales; only the interaction of the two factors explained meaningful variation in this outcome. Interestingly, the study found that provision of controlling rationales did not differ between the high-SES and Black condition and the low-SES and white condition, a finding reminiscent of research which shows that the average Black person with an Associate's degree is as likely to be employed as the average white person with just a high school diploma (O'Sullivan et al., 2014). Furthermore, the results of Study 3 suggest that since, amotivation in school is most consistent with stereotypes of a low-SES & Black student, Black and low-SES students who display signs of amotivation may be at even greater risk of eliciting controlling responses from adults than students who are low-SES but not Black and students who are Black but not low-SES. Future research should investigate the unique and interactive effects that race and SES have on teachers' autonomy-related rationale content.

LIMITATIONS & FUTURE DIRECTIONS

The strengths of this dissertation lie in its ability to support causal claims about the effect that student race and SES have on U.S. adults' provision of autonomy-supportive and controlling rationales. Additionally, all three studies were conducted within diverse and relatively large national samples, including one study conducted in a nationally-representative sample of U.S. teachers. Therefore, the results obtained from these studies may be more likely to generalize to the broader population of U.S. adults and teachers from which these samples were drawn.

Despite these strengths, as with any study, the findings from this dissertation should be interpreted while considering a few limitations. The first limitation is that the two studies

in which causal tests of the main hypothesis were performed were conducted in non-teacher samples. Investigating the motivating style of the general U.S. population, and what bias might exist in that style, is informative because many non-teachers are likely to have influence in some child's life, and we now have some indication of how the messages that they might offer about the purpose of class assignments might be implicitly influenced by the race and SES of the child. Still, although the results of these non-teacher studies (particularly Study 1, which was conducted in a nationally representative sample) may be likely to generalize to the subpopulation of U.S. teachers (see Starck et al., 2020), generalizing requires the large assumption that the causal effect of student race and SES in a lay population would be same as the causal effect in a sample of mostly college-educated professionals who have likely received at least some training in effective motivational practices. Therefore, future research should aim to perform a causal test of the main hypothesis in a nationally-representative teacher sample.

Relatedly, an additional limitation of this dissertation is that it varied the measures and population of study across all three studies. Therefore, the extent to which inter-study inconsistency in the effect of student race and SES may be an artifact of the varied methods (as opposed to a true failure to conceptually replicate Study 1) is unknown. Future research should aim to test whether the results of any of these studies replicate when the same methods are applied in new samples pulled from the same target population.

CONCLUSION

In conclusion, this dissertation provides new and crucial information on how a student's race and SES impact U.S. teachers' and adults' likelihood of offering them autonomy-supportive (vs. controlling) rationales for engaging in classwork. The findings from this research contribute to a broader understanding of racial and socioeconomic

disparities in receipt of support for feeling autonomously engaged in one's own education, and they also suggest the need for more research on the role that bias in provision of autonomy support plays in racial and socioeconomic inequality within the U.S. educational system.

Appendices

APPENDIX A: STUDY 2 CODING FRAME

Note: When coding these responses, we put on the hat of a self-determination theory researcher and temporarily disconnect from other theoretical interpretations of the text

Prompt to 9th grade teachers

"Imagine one of your math students was uninterested in math class and seemed really disengaged, even though the student had the ability to do well. You hear the student say 'what's the point?' The student doesn't see how math is relevant at all. Imagine you wanted to say or do something to motivate this student. What would you say or do? Write a few sentences in the box below."

Introduction

- 9th grade student is currently experiencing amotivation and looking to their teacher to help them figure out one of the following:
    - what the point of learning math is
    - how math is relevant in their lives
    - a reason why they should be motivated to learn math
- We are operating under SDT's assumption that the student (like all humans) has a natural orientation towards growth that manifests itself in the following ways:
    - Being *intrinsically motivated* to pursue certain activities (i.e., enacting behaviors because they seem inherently interesting/enjoyable)
    - Finding the pursuit of *intrinsic life goals* (i.e., intellectual growth, personal growth/meaning in life, community contribution, close relationship building) inherently rewarding/satisfying
    - *Internalizing* (i.e., taking over) the regulation of personally-meaningful behaviors that were initially externally regulated
- However, the student is still capable of the following:
    - Being *externally motivated* (i.e., enacting a behavior due to presence of external incentives or contingencies (e.g., money, grades, other external rewards, threat of punishment, pending evaluation, deadlines)
    - Having *introjected motivation* (i.e., enacting a behavior in order to enhance one's self-worth, avoid self-conscious emotions (i.e., guilt, shame), or obtain approval/avoid disapproval of others)
    - Valuing *extrinsic life goals* (i.e., status, fame/adoration, wealth/material possessions, attractiveness/image)
    - Being chronically *amotivated*, i.e., failing to self-regulate certain activities
- **Order of coding → Ask yourself aloud**:

- Was a **rationale provided** by the teacher or not? In other words, did the student walk away with an answer to their question about the point and/or relevance of math?
    - If a rationale *was* provided, ***what*** was said -- did the rationale have **intrinsic content,** or **extrinsic content**, or neither?
        - *Note*: cannot code for either content if no rationale was provided
    - If codeable content was present, ***how*** was it said -- did the teacher use **autonomy-supportive language**, **controlling language**, or neither?
        - *Note*: cannot code for language if no rationale provided
        - *Note*: cannot code for language if no codeable content was present
- *Note*: if impossible to disentangle rationale content and language, code simultaneously as appropriate
- *Note*: some teachers respond as if talking directly to student, while others respond as if talking to researcher
    - If response phrased as if talking to the researcher, try to mentally rewrite the response as a question/statement to student, and then code it

Coding Frame

- **Rationale Provided:** Teacher attempts to either explain or help the student identify a reason why putting forth effort to learn math might be useful/important/worthwhile
    - ***Examples***:
        - "The point of learning math is to…"
        - "I would inform the student that math is relevant to…"
        - "There are a couple of reasons why math is important to you…" (10117)

What was said (content):

- **Intrinsic Content:** Teacher's rationale refers to one or more internal sources of motivation, i.e., intrinsic interests, intrinsic life goals, and internalized goals/values
    - ***Examples***:
        - Intrinsic interests
            - "I also try to find out what each of my students are interested in so that I can incorporate their interest into my lessons." (10092)
            - "What is something you like to do? Let's see how math is important in making that work out!" (10353)
        - Intrinsic goals
            - *Note*: According to SDT, intrinsic goals include the following:
                - Intellectual growth

- "Math helps develop critical thinking skills that make solving problems a lot easier in the future." (10183)
- "Math is more than just numbers. Becoming better problem solvers is the main goal." (10350)

- Personal growth/meaning in life
  - "I would explain that while not everyone enjoys every subject in school, that the bigger picture is developing a work ethic." (10105)
- Community contribution
  - [??]
- Close relationship building
  - [??]

- Internalized goals/values
  - *Note*: We will assume that the student has been socialized to *identify* with, and possibly *integrate* within themself, the following goals/values:
    - Learning useful life skills
      - "I would explain...how important it is to have financial literacy when it comes to shopping, paying bills, managing a bank account, etc." (10038)
    - Doing well in high school/Learning useful academic skills
      - "I would talk to the student about the need to do well in this class to be successful in this class and in their upcoming classes." (10151)
    - Going to/doing well in college, esp. in their desired major
      - "Studying math can help you thinking skills so you're ready to pursue any major or job after high school." (10020)
    - Getting/doing well in a job, esp. their desired career
      - "What is your dream career? Then we could figure out how math will be used in their future to make it more relevant." (10031)

- ***Decision Rules***:
  - Unless stated explicitly, teachers who offer rationales related to intrinsic content do not do so with the intention of invoking extrinsic content
  - If the teacher's point in mentioning intrinsic content is to facilitate the promotion of extrinsic rationales, then code response as extrinsic

        - If impossible to disentangle two types of content, or if they are mentioned in isolation of each other, code for both
    - Rationales that mention money in terms of gaining financial literacy count as intrinsic content; rationales that mention money as a desirable outcome of learning math count as extrinsic content
    - Rationales that mention success in terms of gaining competence count as intrinsic content; rationales that mention success in terms of social comparison or material wealth count as extrinsic content
- **Extrinsic Content:** Teacher's rationale refers to one or more external sources of motivation, i.e., external incentives, extrinsic life goals, and conditional regard
    - ***Examples***:
        - External incentives
            - *Note*: We will count the following as examples of external incentives
                - Contingent Receipt of Money and Other Tangible Rewards
                    - "...you need to get scholarships into Universities..." (10009)
                - Deadlines/Pending Evaluations
                    - Grades
                        - "My first thought would be to make the importance of learning the math about the student's grades." (10184)
                    - Exams
                        - "..it would benefit you to learn the easy things as a foundation for all of the harder skills that are needed in order for you to pass the state mandated tests." (10233)
                    - Interviews
                        - "First off ... most jobs look for at least a high school diploma" (10275)
                    - Other
                        - "I would explain to the student that learning math is about showing the teacher and the school that you can follow and understand a procedure." (10184)
                - Evaluative Obstacles
                    - "First off you need math to graduate..." (10275)
                - Others' Needs for Autonomy/Competence
                    - "I am asking you to complete this task so *I* can have the option to give you a grade."

- "Can you help me with something? Would you help out a student who is struggling for me, I really could use your help?" (10311)

- Extrinsic goals
  - *Note*: According to SDT, extrinsic goals include the following:
    - Wealth/Material Gain
      - "Math skills are...useful when you are, say, negotiating a car loan or a house loan." (10117)
    - Attractiveness/Image
      - "The point is...so that you can show you are teachable." (10299)
    - Fame/Adoration/Status
      - [??]
- Conditional regard
  - [??]

- ***Decision Rules***:
  - If the teacher's point in mentioning extrinsic content is to facilitate the promotion of intrinsic rationales, then code response as intrinsic
    - If impossible to disentangle two types of content, or if they are mentioned in isolation of each other, code for both
  - Rationales that mention money in terms of gaining financial literacy count as intrinsic content; rationales that mention money as a desirable outcome of learning math count as extrinsic content
  - Rationales that mention success in terms of gaining competence count as intrinsic content; rationales that mention success in terms of social comparison or material wealth count as extrinsic content

How was it said (context/language):

- **Autonomy-Supportive Language:** Teacher communicates rationale content in a way that is likely to make the student feel that any subsequent decision to engage in learning math would be a voluntary or freely-made choice
  - ***Examples***:
    - Uses inviting language *in a way that communicates choice*
      - "You may/might/can/have the option to..."
      - "It's up to you!"
    - Acknowledges and accepts students' perspective and thoughts/feelings as valid
      - "Often times we see classwork and want to know exactly how we are going to be applying this specific concept every single day in life." (10280)
    - Supports other psychological needs (i.e., relatedness, competence) for its own sake

        - *Note*: According to SDT, other key psychological needs include the following:
            - Relatedness
                - [??]
            - Competence
                - "You have the ability to do very well in this class." (10141)
    - ***Decision Rules***:
        - We will assume that it is normal for students to feel disengaged at times or to be doubtful/questioning
            - Teachers who directly communicate this notion to the student are considered autonomy-supportive
            - Teachers who directly refute this notion are considered controlling
- **Controlling Language:** Teacher communicates rationale content in a way that is likely to make the student feel that any subsequent decision to engage in learning math would be an internally- or externally-pressured choice
    - ***Examples***:
        - Uses directive, pressurizing language *in a way that communicates obligation*
            - "You must/should/need to/have to…"
            - "You may not like math now, but if you sop learning it now you may find down the road that something you do like utilizes what we are learning here." (10353)
            - "...you don't want to get yourself in a predicament where you can't take the higher levels of math, such as Calculus, because you haven't done your work right now." (10070)
            - "I would...let them know you will check on them to see if they are staying on point." (10256)
            - [shame, guilt]
        - Discourage student from expressing doubts, questions, and negative thoughts/feelings, or from behaving in ways that are contrary to what the teacher wants or believes
            - "How is that supposed to work if you are complaining about my math class?" (10233)
            - "I would also probably ask that student in private if something is going on outside of class that is causing them to carry a negative attitude toward learning." (10257)
    - ***Decision Rules***:
        - Use of the word "will" is only controlling if the overall statement that the teacher is making is not plausibly true
        - We will assume that it is normal for students to feel disengaged at times or to be doubtful/questioning

        - Teachers who directly communicate this notion to the student are considered autonomy-supportive
        - Teachers who directly refute this notion are considered controlling
    - Messages that ignore the student's question about the relevance of math in favor of addressing the student's question about the point of learning math are not considered controlling (since student technically asked for both)

APPENDIX B: STUDY 2 CODING PROTOCOL

Dataset: National Study of Learning Mindsets (NSLM) 2015-2016 Math Teacher Survey
Question: #21
Project: Content Analysis of Autonomy-Related Motivational Messages
Project Supervisor: Melanie Gonzalez (msgonzalez@utexas.edu)
Dates: December 2018 – May 2019

Introduction

Sample

- N = 291 9th grade math teachers situated within N = 72 regular U.S. public high schools

Question #21 Prompt

"Imagine one of your math students was uninterested in math class and seemed really disengaged, even though the student had the ability to do well. You hear the student say "what's the point?" The student doesn't see how math is relevant at all. Imagine you wanted to say or do something to motivate this student. What would you say or do? Write a few sentences in the box below."

Aim of Prompt

- The proximal goal of the prompt was to gauge what self-generated messages and practices U.S. 9th grade math teachers might use to motivate students who become disengaged in math class and start to question the importance and relevance of math.
- The distal goal of the prompt was to investigate whether math teachers' motivational messages and practices moderate the effect of a growth mindset of intelligence intervention on students' math challenge-seeking, grades, and advanced course-taking.

Aim of Project

- The proximal goal of the coding project was to investigate the autonomy-related content and context of 9th grade math teachers' self-generated rationales for engaging in math.
    - Selection of coding categories was informed by self-determination theory (SDT; Ryan & Deci, 2000, 2017c), which makes clear, directional predictions about how a rationale's content (i.e., what is said) and context (i.e., how it is said) can impact students' sense of autonomous (vs. controlled) engagement. These predictions about the effect of rationale content (Reeve et al., 2002; Steingut et al., 2017) context (Vansteenkiste et

al., 2005; Vansteenkiste, Simons, Lens, et al., 2004) have received empirical support.

- The distal goal of the coding project was to investigate whether the content and context of math teachers' self-generated rationales might vary with the racial and socioeconomic composition of the students that they are linked to within the NSLM dataset.
    - I hypothesized that teachers linked to higher proportions of Black students and/or higher proportions of low social class students would be less likely to self-generate autonomy-supportive rationales to motivate engagement in math.

Coders

- Coder A (project supervisor; Black, female, age 26, pursuing Ph.D. in Psychology)
- Coder B (undergraduate RA; Korean, female, age 19, pursuing Bachelors in Psychology)
- Coder C (undergraduate RA; Black, female, age 19, pursuing Bachelors in Psychology)

Procedure for Content Analysis

- The content analysis followed guidelines put forth by Krippendorff (2004) and Schreier (2012). Below is an overview of how the content analysis proceeded in three stages:
    - **Training Stage**
        - Coder A recruited Coders B and C to the project in December and, for one month, trained them in the major tenets and predictions of SDT, particularly those of SDT's organismic integration mini-theory (see Ryan & Deci, 2017b) and goal contents mini-theory (see Ryan & Deci, 2017a).
        - Throughout the month of January, Coder A developed an initial theory-informed coding frame consisting of five codes. Coder A also wrote a preamble to the coding frame intended to help elucidate who the target of teachers' responses was, the assumptions coders were allowed to make about the target student, and the appropriate order in which to evaluate the presence of the five codes. Lastly, Coder A also trained Coders B and C together in how to apply the coding frame to two small sets of hypothetical responses to Q#21 that were heavily inspired by teachers' actual responses.
    - **Pilot Coding Stage**
        - From early February to late March, Coder A led Coders B and C in pilot coding the responses to Q#21 in order to make the theory-informed coding frame better suit the data. Pilot coding proceeded as follows:

1. Coder A drew one small random subset of teacher responses to Q#21 from the dataset. All coders independently coded each response in this subset against the coding frame in Excel, assigning each response a value of 1 under a particular code column if the code was present in the response and a value of 0 if it was not.
2. After this subset was coded, Coder A assessed intercoder reliability with the goal of achieving a Krippendorff's alpha (Krippendorff, 2004) of at least .80 on each of the five codes in the frame. All three coders came together to resolve any disagreements that arose.
3. After resolving disagreements, Coder A revised the coding frame to minimize uncertainties that led to disagreements in this subset.
4. After revising the coding frame, Coder A then repeated Steps 1-3 until no further improvements in interrater reliability were seen and all crucial revisions to the coding frame had been made.

- **Final Coding Stage**
  - In early April, Coder A consulted an expert in SDT (Dr. Erika Patall) for guidance on coding a handful of responses to Q#21 that the team could not come to an agreement on during the pilot coding stage.
  - After adjusting the coding frame to account for Dr. Patall's suggestions, Coder A declared the coding frame as final and led Coders B and C in the official coding of the responses to Q#21. Final coding proceeded in much the same way as pilot coding did, except that:
    - Coder A coded 100% of the responses in the dataset, while Coders B and C each coded only 50%, and
    - Coding frame revisions no longer occurred after disagreements

Coding Log

Training Stage

December 16th, 2018 (Email Communication)

- Coder A assigned all coders to read Ryan & Deci (2000), which provides an introduction to the central tenets and predictions made by SDT.
- Coders B and C also had to prepare written answers to the following comprehension questions:
  - *What central argument do the authors make about human needs?*
  - *What role does autonomy play in human motivation and behavior?*

- *What does the article say about how goals and rationales can impact motivation and behavior?*

December 18th, 2018 (Research Meeting)

- During the meeting, Coder A led Coders B and C in a discussion of their answers to the comprehension questions for Ryan & Deci (2000), as well as an exercise in which they reviewed the taxonomy of motivations proposed in SDT's organismic integration mini-theory.

December 24th, 2018 (Email Communication)

- Coder A assigned all coders to read Reeve (2009), which provides an overview of research on how teachers' autonomy-related instructional practices influences students' motivation and behavior.
- Coders B and C also had to prepare written answers to the following comprehension questions:
  - *What is a controlling motivating style, and what conditions make it easy to identify teachers with this motivational approach? By comparison, what is an autonomy-supportive motivating style, and what conditions make it easy to identify teachers with this motivational approach?*
  - *Which instructional practices are most commonly used by teachers with a controlling motivational style? By comparison, which instructional practices are most commonly used by teachers with an autonomy-supportive motivational style?*
  - *What effect does autonomy support typically have on students' educational outcomes? According to the authors, why does a controlling motivational style not have the same benefits as an autonomy-supportive one?*

December 27th, 2018 (Research Meeting)

- During the meeting, Coder A led Coders B and C in a discussion of their answers to the comprehension questions for Reeve (2009).

December 31st, 2018 (Email Communication)

- Coder A assigned all coders to read Vansteenkiste, Lens, and Deci (2006), which provides an overview of research based in SDT's goal contents mini-theory, which makes predictions about how the autonomy-related content of goals can impact students' motivation and behavior.
- Coders B and C also had to prepare written answers to the following comprehension questions:
  - *According to self-determination theory, what are some examples of intrinsic personal goals, and why are they considered to be intrinsic? By comparison, what are some examples of extrinsic personal goals, and why are they considered to be extrinsic?*
  - *How do goal contents differ from goal motives? Can you provide a novel example of how the content of someone's goal can be independent of their motive for the goal?*
  - *What effect does intrinsic vs. extrinsic goal framing tend to have on students' learning, engagement, and performance? What explanations do*

the authors give for why extrinsic goal framing tends to be more detrimental to students?
    - *How do goal contents differ from goal contexts? Can you provide an example of how the content of goal framing can be independent of the context in which the goal is embedded?*

January 2nd, 2019 (Research Meeting)

- During the meeting, Coder A led Coders B and C in a discussion of their answers to the comprehension questions for Vansteenkiste et al. (2006).
- Coder A also introduced the initial coding frame, which began with the Q#21 prompt followed by three SDT-informed codes (selected by Coder A) with hypothetical examples included:
    - ***Rationale Provided***
        - *Teacher attempts to either explain or help the student identify what the purpose or relevance of math may be*
    - ***Autonomy-Supportive Content***
        - *Rationale is likely to help the student experience learning as a voluntary behavior because it relies on internal sources of motivation*
            - Examples:
                - Internalized Goal
                    - "It's relevant to your future career."
                - Intrinsic Goal
                    - "It will help you to develop problem-solving/creativity skills."
                - Intrinsic Interest
                    - "Math is related to your hobbies."
    - ***Controlling Content***
        - *Rationale is likely to help the student experience learning as a compulsory behavior because it relies on external sources of motivation*
            - Examples:
                - Prize/Grades
                    - "You need this assignment in order to pass the class."
                - Peers
                    - "Everyone else is doing it…"
                - Self-Worth/Self-Presentation Concerns
                    - "Don't be lazy! This is easy."
- After reviewing the initial coding frame together, all coders agreed that two new codes should be added to the frame in order to account for SDT's distinction between the autonomy-related *contents* of a rationale and the autonomy-related *language* with which such content is communicated.

January 9th, 2019 (Off-Time)

- Coder A added the following two codes to the coding frame to capture the autonomy-relevant aspects of the language with which rationale contents were communicated:
    - ***Autonomy-Supportive Language***
        - *Teacher communicated rationale in a way that is likely to help the student feel that learning math is a volitional act (i.e., is primarily motivated by their personal values and free will)*
            - Examples:
                - Use inviting language that communicates choice
                    - "You may/might/can..."
                    - "It's up to you!"
                - Acknowledge and accept students' perspective and thoughts/feelings as valid
                    - "I understand how you feel."
    - ***Controlling Language***
        - *Teacher communicates rationale in a way that is likely to make the student feel that learning math is a forced or pressured act (i.e., is primarily motivated by the values, wishes, or concern for someone/something other than the self)*
            - Examples:
                - Use directive, pressurizing language that communicates obligation
                    - "You must/should/need to/have to…"
                    - "Do your work now!"
                - Discourage student from expressing negative thoughts/feelings or behaving in ways that are contrary to what the teacher wants
                    - "Don't be lazy."
                    - "Everyone else is doing the same work, so why are you complaining?"
- Coder A also updated the definitions and examples of the *Autonomy-Supportive Content* and *Controlling Content* codes
    - ***Autonomy-Supportive Content***
        - *Content of teacher's rationale contains references to one or more internal sources of motivation for students, i.e., their intrinsic interests, intrinsic goals (i.e., personal growth, intellectual growth, relationship building, community contribution), and internalized goals/values*
            - Examples:
                - Internalized Goal
                    - "People in your desired career use math all the time."
                - Intrinsic Goal

            - "Math helps to build better problem-solving and creativity skills."
        - Intrinsic Interest
            - "Math is related to your hobbies."
- ***Controlling Content***
    - *Content of teacher's rationale contains references to one or more external sources of motivation for students, i.e., contingent rewards, evaluative pressure, deadlines, conditional positive regard, pride/guilt/shame, and extrinsic goals (i.e., attractiveness, status/power, wealth, fame)*
        - Examples:
            - Shame/guilt
                - "Future 'you' will regret not learning math."
            - Evaluative pressure
                - "You are going to be tested on this material next week."
            - Extrinsic goal
                - "Being good at math will make you more appealing to colleges."

January 10th, 2019 (Research Meeting)

- Prior to the meeting, Coder A changed the name of the *Autonomy-Supportive Content* code to *Intrinsic Content*, and changed the name of the *Controlling Content* code to *Extrinsic Content.*
- Prior to the meeting, Coder A also generated 11 hypothetical teacher responses to Q#21 that were inspired by teachers' real self-generated responses (hereafter referred to as *Hypothetical Set 1*) and put them into an Excel file where each row contained a hypothetical response and each column represented a code from the initial coding frame.
- During the meeting, Coder A reviewed the new coding frame with Coders B and C, and then trained them in how to code *Hypothetical Set 1* against the coding frame.

January 18th, 2019 (Off-Time)

- During the discussion of intercoder agreement during the January 10th research meeting, several questions emerged regarding what could be assumed about the target student in the Q#21 prompt, if SDT's assumptions about human nature are true. Therefore, Coder A added a preamble to the coding frame (below the Q#21 prompt) that provided answers to these questions:
    - 9th grade student is currently experiencing amotivation and looking to their teacher to help them figure out one of the following:
        - what the point of learning math is
        - how math is relevant in their lives
        - a reason why they should be motivated to learn math

- We are operating under SDT's assumption that the student (like all humans) has a natural growth orientation that manifests itself in the following ways:
    - Being *intrinsically motivated* (i.e., enacting a behavior because they find it inherently interesting/enjoyable)
    - Finding the pursuit of *intrinsic life goals* (i.e., intellectual growth, personal growth/meaning in life, community contribution, close relationship building) inherently rewarding/satisfying
        - Note: we will personally assume that, unless stated explicitly, teacher responses that mention intrinsic life goals do <u>not</u> do so with the intention of drawing social comparison
    - *Internalizing* (i.e., taking over) the regulation of behaviors that were initially externally-regulated
        - Note: we will personally assume that the student *identifies* with, and has possibly *integrated* within themselves, the following goals/values (i.e., they have been socialized):
            - Learning useful academic skills
            - Learning useful life skills
            - Graduating high school
            - Going to college, esp. their desired college
            - Getting a job, esp. their desired job
- However, this does not mean that the student cannot still do the following:
    - Be *externally motivated* (i.e., enact a behavior due to the presence of an external incentive or contingency (e.g., grades, threat of punishment, promise of rewards, pending evaluation, deadlines))
    - Have *introjected motivation* (i.e., enact a behavior in order to enhance their own self-worth, avoid self-conscious emotions (i.e., guilt, shame), or obtain the approval of others)
    - Pursue *extrinsic life goals* (i.e., status, fame/adoration, wealth/material possessions, attractiveness/image)
    - Fail to internalize the regulation of behaviors (e.g., be amotivated)

- There were also several questions that emerged during that discussion regarding the order in which to evaluate the five codes, the dependencies between the codes, and how to address the complexities in teachers' responses. Therefore, Coder A added the following bullet points that answered those questions at the very end of the preamble:
    - Order of coding → Ask yourself aloud:
        - Was a **rationale provided** by the teacher or not?
            - If a rationale *was* provided, did the rationale have **intrinsic content,** or **extrinsic content**, or neither?

        - Even if there was *no* rationale provided, did the teacher use **autonomy-supportive language,** or **controlling language**, or neither?
    - If teacher response says something like "I would ask/tell the student…", mentally rewrite the response as a question/statement, and then code it
    - If it is impossible to disentangle content and context, then code them simultaneously as appropriate
- Lastly, Coder A updated the definitions and examples of the *Extrinsic Content* code, as well as the definitions of the *Autonomy-Supportive Language* and *Controlling Language* codes
    - ***Extrinsic Content***
        - *Content of teacher's rationale contains references to one or more external sources of motivation for students, i.e., external incentives, extrinsic life goals, and introjects*
            - Examples:
                - External incentive (here: pending evaluation)
                    - "You are going to be tested on this material later this week."
                - Extrinsic goal (here: image)
                    - "Good math skills will help you seem more attractive to employers."
                - Introject (here: avoid shame)
                    - "You might regret not learning math in the future."
    - ***Autonomy-Supportive Language***
        - *Teacher communicated rationale in a way that is likely to help the student feel that learning math is a volitional act (i.e., is primarily motivated by their personal values and free will)*
    - ***Controlling Language***
        - *Teacher communicates rationale in a way that is likely to make the student feel that learning math is a forced or pressured act (i.e., is primarily motivated by the values, wishes, or concern for someone/something other than the self)*

January 20th, 2019 (Research Meeting)

- During the meeting, Coder A reviewed the updated coding frame with Coders B and C, then all coders recoded *Hypothetical Set 1* and discussed disagreement.
- In light of this discussion, Coder A also added the following example to the *Controlling Language* code during the meeting:
    - ***Controlling Language***
        - Examples:
            - Suggest that others' (e.g., teacher's) need for autonomy supercede students' needs

        - "I am asking you to complete this task so *I* can (have the option to) give you a grade."

January 28th, 2019 (Research Meeting)

- Prior to this meeting, Coder A generated 11 new hypothetical teacher responses to Question #21 (hereafter referred to as *Hypothetical Set 2*) and put them into an Excel file where each row contained a hypothetical response and each column represented a code from the initial coding frame.
- During the meeting, all coders finished discussing disagreement on the coding of *Hypothetical Set 1*. Then, all coders independently coded *Hypothetical Set 2*.

January 30th, 2019 (Research Meeting)

- During the meeting, all coders discussed disagreement on the coding of the first 5 responses in *Hypothetical Set 2*. As a result of this discussion, Coder A added the following hypothetical examples of the *Autonomy-Supportive Language* code:
    - ***Autonomy-Supportive Language***
        - Examples:
            - Attempts to personalize content of rationale/flow of instruction to match the student
                - "What can I do to make this more interesting?"
            - Supports students' other psychological needs (i.e., relatedness, competence)
                - "I would remind them of how capable they are and offer help if they needed it."
                - "You're not the only one who feels this way. I/lots of your classmates used to think that math was/is boring too!"
                - "Lots of great doctors were uninterested in/had to work hard to become good at math. That puts you in good company."
- During the meeting, Coder A also updated the following hypothetical example of the *Controlling Language* code:
    - ***Controlling Language***
        - Examples:
            - Discourage student from expressing doubts, questions, and negative thoughts/feelings or from behaving in ways that are contrary to what the teacher wants or believes
                - "Stop being lazy."
                - "Are you nuts? Math is fun!"
                - "It's not about relevance…."

January 31st, 2019 (Research Meeting)

- During the meeting, since the coding guide underwent significant changes during the last meeting, Coder A reviewed the updated coding frame with Coders B and C, then directed all coders to independently recode the last 6 responses in *Hypothetical Set 2*. All coders then resumed discussing disagreement on the coding.

Pilot Coding Stage

February 4th, 2019 (Research Meeting)

- Prior to the meeting, Coder A randomly selected 11 real teacher responses to Q#21 without replacement (hereafter referred to as *Pilot Coding Set 1*) and put them into an Excel file where each row contained a response and each column represented a code from the initial coding frame.
- Prior to the meeting, Coder A also added the following note to the very top of the preamble to the coding frame:
    - *Note: Adopting the mindset of an SDT researcher might mean detaching yourself from other theoretical interpretations of the text.*
- During the meeting, all coders finished discussing disagreement on the coding of *Hypothetical Set 2*. Then all coders independently coded *Pilot Coding Set 1*.
    - Intercoder reliability for *Pilot Coding Set 1* (Krippendorf's alpha; 3 coders; 11 responses):
        - **Rationale Provided: .866**
        - **Intrinsic Content: .511**
        - **Extrinsic Content: -.083**
        - **Autonomy-Supportive Content: .267**
        - **Controlling Content: .464**

February 7th, 2019 (Research Meeting)

- During the meeting, all coders reread Vansteenkiste, Lens, Deci (2006) in order to a) ensure that the coding guide was still aligned with SDT and b) refresh Coders B and C's memory of the predictions made by the goal contents mini-theory.
- As a result of the discussion that followed this reading, Coder A added the following decision rule underneath the *Intrinsic Content* code during the meeting:
    - Note:
        - Money messages that support internalized/intrinsic goals are counted as intrinsic; anything else is extrinsic
        - Success messages that imply being competent are intrinsic; those that imply social comparison or material wealth are extrinsic
- Coder A also added the following bullet points to the coding frame (above the two context codes) during the meeting:
    - Normal for students to feel disengaged and doubtful/questionnaire in moments
        - Teachers who go out of their way to let the student know that are autonomy-supportive
        - Teachers who make the student feel bad are controlling

February 13th, 2019 (Research Meeting)

- Prior to the meeting, Coder A updated the following note at the very top of the preamble to the coding frame:

    - *Note: When coding these responses, we put on the hat of a self-determination theory research and temporarily disconnect from other theoretical interpretations of the text.*
- Prior to the meeting, Coder A also added the following decision rule underneath the *Extrinsic Content* code:
    - Note:
        - Money messages that support internalized/intrinsic goals are counted as intrinsic; anything else is extrinsic
        - Success messages that imply being competent are intrinsic; those that imply social comparison or material wealth are extrinsic
- During the meeting, since the coding guide had underwent significant changes since the start of the last meeting, Coder A reviewed the updated coding frame with Coders B and C, and then directed all coders to independently recode *Pilot Coding Set 1*.
    - Intercoder reliability for recode of *Pilot Coding Set 1* (Krippendorf's alpha; 3 coders; 11 responses):
        - **Rationale Provided: .866**
        - **Intrinsic Content: .511**
        - **Extrinsic Content: -.083**
        - **Autonomy-Supportive Content: .283**
        - **Controlling Content: .576**
- All coders then met and began discussing disagreement on the coding. In light of this discussion, Coder A added the following decision rule beneath the *Intrinsic Content* code during the meeting:
    - Note:
        - Unless stated explicitly, teacher responses that mention intrinsic life goals do not do so with the intention of drawing social comparison

February 15th, 2019 (Research Meeting)

- During the meeting, all coders met and continued discussing disagreement on the coding of *Pilot Coding Set 1*.

February 20th, 2019 (Off Time)

- Coder A randomly selected 9 new real teacher responses to Question #21 without replacement (hereafter referred to as *Pilot Coding Set 2*) and put them into an Excel file where each row contained a response and each column represented a code from the initial coding frame.

February 21st, 2019 (Research Meeting)

- During the meeting, all coders met and finished discussing disagreement on the coding of *Pilot Coding Set 1*.
- During the meeting, Coder A updated the definition for the *Extrinsic Content* code:
    - ***Extrinsic Content***
        - *Content of teacher's rationale contains refers to one or more external sources of motivation for students, i.e., external incentives (money, prizes, pending evaluation (grades, exams, college*

recruitment, interviews), extrinsic life goals (status, fame/adoration, wealth/material possessions, attractiveness/image), and introjects (shame, guilt, self-consciousness, conditional regard)

- Coder A also added the following decision rule under one of the examples of the *Autonomy-Supportive Language* code:
    - ***Autonomy-Supportive Language***
        - *Examples:*
            - *Explicitly attempts to personalize flow of instruction to match the student*
                - *"What can I do to make this more interesting?"*
                - *Note:*
                    - *Does not include attempts to personalize rationale content (e.g., "What do you want to do when you grow up?"*
- Coder A also made updates to another example of the *Autonomy-Supportive Language* code:
    - ***Autonomy-Supportive Language***
        - *Examples:*
            - *Supports other psychological needs (i.e., relatedness, competence) for its own sake*
                - *"I would remind them of how capable they are and offer help if they needed it."*
                - *"You're not the only one who feels this way. I used to/lots of your classmates think that math was/is boring too!"*
                - *"Lots of great doctors were uninterested in/had to work hard to become good at math. That puts you in good company."*
                - *"I like that you are working through a process."*
- Lastly, Coder A made updates to one of the examples of the *Controlling Language* code:
    - ***Controlling Language***
        - *Examples:*
            - *Use directive, pressurizing language in a way that communicates obligation*
                - *"You must/should/need to/have to…"*
                - *"Everyone else is already working hard."*
                - *"You are really smart at math."*
            - *Suggest that others' (e.g., teacher's) need for autonomy supercede students' needs*
                - *"I am asking you to complete this task so I can (have the option to) give you a grade."*

- *"Can you help out this other student who is struggling for me?"*

February 21st – 24th, 2019 (Off Time)

- Coders A and B independently coded *Pilot Coding Set 2*. Coder C independently coded *Pilot Coding Set 2* on February 27th, blind to the coding decisions of the other coders.
    - Intercoder reliability for *Pilot Coding Set 2* (Krippendorf's alpha; 3 coders; 9 responses):
        - **Rationale Provided: -.019**
        - **Intrinsic Content: .673**
        - **Extrinsic Content: .688**
        - **Autonomy-Supportive Content: .712**
        - **Controlling Content: .849**

February 25th, 2019 (Research Meeting)

- Prior to this meeting, Coder A randomly selected 10 new real teacher responses to Question #21 without replacement (hereafter referred to as *Pilot Coding Set 3*) and put them into an Excel file where each row contained a response and each column represented a code from the initial coding frame.
- During this meeting, Coders A and B met to discuss disagreement on the coding of *Pilot Coding Set 2* (Coder C was out sick).

February 25th – 27th, 2019 (Off Time)

- Coder C independently coded *Pilot Coding Set 2* on February 27th, blind to the coding decisions of the other coders.
- All coders independently coded *Pilot Coding Set 3*.
    - Intercoder reliability for *Pilot Coding Set 3* (Krippendorf's alpha; 3 coders; 10 responses):
        - **Rationale Provided: .817**
        - **Intrinsic Content: .466**
        - **Extrinsic Content: .45**
        - **Autonomy-Supportive Content: .59**
        - **Controlling Content: .738**

February 27th, 2019 (Research Meeting)

- Coder B was out for academic reasons so, during this meeting, Coders A and C met to discuss disagreement on the coding of *Pilot Coding Set 2*. Coders A and C also began discussing disagreement of *Pilot Coding Set 3*.
- During this meeting, Coder A updated the definition for the *Extrinsic Content* code:
    - ***Extrinsic Content***
        - *Content of teacher's rationale contains refers to one or more external sources of motivation for students, i.e., external incentives (money, prizes, pending evaluation (grades, exams, college recruitment, interviews), graduation being conditional on performance, extrinsic life goals (status, fame/adoration,*

wealth/material possessions, attractiveness/image), and introjects (shame, guilt, self-consciousness, conditional regard)

March 1st, 2019 (Off Time)

- Coder A randomly selected 10 new real teacher responses to Question #21 without replacement (hereafter referred to as *Pilot Coding Set 4*) and put them into an Excel file where each row contained a response and each column represented a code from the initial coding frame.

March 3rd, 2019 (Off Time)

- All coders independently coded *Pilot Coding Set 4*.
    - Intercoder reliability for *Pilot Coding Set 4* (Krippendorf's alpha; 3 coders; 10 responses):
        - **Rationale Provided: 1.00**
        - **Intrinsic Content: .59**
        - **Extrinsic Content: .764**
        - **Autonomy-Supportive Content: -.015**
        - **Controlling Content: .853**

March 4th, 2019 (Research Meeting)

- Coder A was out for academic reasons so, during this meeting, Coders B and C met to continue discussing disagreement on the coding of *Pilot Coding Set 3*.
- During this meeting, Coders B and C also began discussing agreement on *Pilot Coding Set 4*.

March 5th, 2019 (Off Time)

- Coder A randomly selected 10 new real teacher responses to Question #21 without replacement (hereafter referred to as *Pilot Coding Set 5*) and put them into an Excel file where each row contained a response and each column represented a code from the initial coding frame.

March 6th – 7th, 2019 (Off Time)

- Coders B and C independently coded *Pilot Coding Set 5*. Coder A independently coded *Pilot Coding Set 5* on March 19th, blind to the coding decisions of the other coders.
    - Intercoder reliability for *Pilot Coding Set 5* (Krippendorf's alpha; 3 coders; 10 responses):
        - **Rationale Provided: 1.00**
        - **Intrinsic Content: .859**
        - **Extrinsic Content: .634**
        - **Autonomy-Supportive Content: .473**
        - **Controlling Content: .557**

March 7th, 2019 (Research Meeting)

- Coder A was away at a conference so, during this meeting, Coders B and C met to continue discussing disagreement on the coding of *Pilot Coding Set 4*.
- During this meeting, Coders B and C also began discussing disagreement on *Pilot Coding Set 5*.

March 18th-23rd, 2019 (SPRING BREAK)

March 25th, 2019 (Research Meeting)

- Coder B was still away on spring break-related travel, so during this meeting, Coders A and C met to finish discussing disagreement on the coding of *Pilot Coding Sets 3-5*.

March 27th, 2019 (Research Meeting)

- Prior to the meeting, Coder A randomly selected 20 new real teacher responses to Question #21 without replacement (hereafter referred to as *Pilot Coding Set 6*) and put them into an Excel file where each row contained a response and each column represented a code from the initial coding frame.
- Coders A, B, and C independently coded the first five responses in *Pilot Coding Set 6* and discussed disagreements.

March 25th -27th, 2019 (Off Time & Research Meeting)

- Coder A made considerable revisions to clean up the coding guide based on the discussions of disagreements that had happened over the preceding weeks, including adding examples of codes pulled straight from the dataset, adding decision rules, providing clearer definitions of codes, revising the preamble, etc. *See Appendix A for an indication of what changes were made to the coding frame.*

April 1st, 2019 (Off Time)

- Coder A met with an SDT expert (Dr. Erika Patall) to get her opinion on 12 responses that the coding team was either uncertain of how to code or having a hard time coming to an agreement on how to code
- Following this discussion with Dr. Patall, Coder A updated to coding frame, including
    - The decision rule as pertaining to money-related rationales under the *Intrinsic Content* and *Extrinsic Content* codes:
        - Decision Rules:
            - Rationales that mention money in terms of gaining financial literacy count as intrinsic content; rationales that mention money as a desirable outcome of learning math count as extrinsic content
    - A new decision rule under the *Controlling Language* code that clarifies what to do about teachers who responded to one question posed by the student but not the other (e.g., how's it relevant vs. what's the point)
        - Decision Rules:
            - Messages that ignore the student's question about the relevance of math in favor of addressing the student's question about the point of learning are not considered controlling

April 8th, 2019 (Research Meeting)

- At the start of the meeting, Coder A reviewed the changes to the coding frame with Coders B and C, as well as Dr. Patall's suggestions on how to code the set of tricky responses.
- All coders independently coded the remaining 15 responses in *Pilot Coding Set 6*.

    - Intercoder reliability for *Pilot Coding Set 6* (Krippendorf's alpha; 3 coders; 10 responses):
        - **Rationale Provided: 1.00**
        - **Intrinsic Content: .813**
        - **Extrinsic Content: .186**
        - **Autonomy-Supportive Content: .729**
        - **Controlling Content: .451**
- During this meeting, Coder A made changes to the coding frame; specifically, she renames one of the categories of examples of an external incentive under the *Extrinsic Content* code from *Contingency of Graduation* to *Evaluative Obstacles*
- Following this meeting, the coding frame was declared as final and the transition to the final coding stage began.

Final Coding Stage

April 10th -19th, 2019

- Coder A randomly selected 3 sets of 22 real teacher responses to Q#21 from the full dataset, without replacement, to be coded with Coder B (hereafter referred to as *Final Coding Sets 1B – 3B*). Coder A put each set into an Excel file where each row contained a response and each column represented a code from the initial coding frame.
    - Coder A also put each set into an Excel file that would hold the final coding decisions for each set (hereafter referred to as *Final Results Sets 1B-3B*).
- Coder A also randomly selected 3 sets of 22 real teacher responses to Q#21 from the full dataset, without replacement, to be coded with Coder C (hereafter referred to as *Final Coding Sets 1C – 3C*). Coder A put each set into an Excel file where each row contained a response and each column represented a code from the initial coding frame.
    - Coder A also put each set into an Excel file that would hold the final coding decisions for each set (hereafter referred to as *Final Results Sets 1C-3C*).

April 10th -11th, 2019

- Coders A and C coded *Final Coding Set 1C* and met to discuss disagreement
    - Intercoder reliability for *Final Coding Set 1C* (Krippendorf's alpha; 2 coders; 22 responses):
        - **Rationale Provided: .795**
        - **Intrinsic Content: .911**
        - **Extrinsic Content: 1.00**
        - **Autonomy-Supportive Content: .502**
        - **Controlling Content: 1.00**
- Once agreement was reached on *Final Coding Set 1C*, Coder A pasted the results into *Final Results Set 1C*.

April 10th -12th, 2019

- Coders A and B coded *Final Coding Set 1B* and met to discuss disagreement

    - Intercoder reliability for *Final Coding Set 1B* (Krippendorf's alpha; 2 coders; 22 responses):
        - **Rationale Provided: .776**
        - **Intrinsic Content: .632**
        - **Extrinsic Content: .338**
        - **Autonomy-Supportive Content: .494**
        - **Controlling Content: .246**
- Once agreement was reached on most responses in *Final Coding Set 1B*, Coder A pasted the results into *Final Results Set 1B*, making note of which responses Coder C would need to be consulted on.
- Disagreement in *Final Coding Set 1B* that Coders A and B could not resolve on their own were resolved by Coder C on May 18th and 20th, and the results were pasted into *Final Results Set 1B.*

April 15th -18th, 2019

- Coders A and C coded *Final Coding Set 2C* and met to discuss disagreement
    - Intercoder reliability for *Final Coding Set 2C* (Krippendorf's alpha; 2 coders; 22 responses):
        - **Rationale Provided: .901**
        - **Intrinsic Content: .449**
        - **Extrinsic Content: .463**
        - **Autonomy-Supportive Content: .747**
        - **Controlling Content: -.132**
- Once agreement was reached on most responses in *Final Coding Set 2C*, Coder A pasted the results into *Final Results Set 2C*, making note of which responses Coder B would need to be consulted on.
- Disagreement in *Final Coding Set 2C* that Coders A and C could not resolve on their own were resolved by Coder B on April 25th, and the results were pasted into *Final Results Set 2C.*

April 17th, 2019

- Coders A and B coded *Final Coding Set 2B* and met to discuss disagreement
    - Intercoder reliability for *Final Coding Set 2B* (Krippendorf's alpha; 2 coders; 22 responses):
        - **Rationale Provided: 1.00**
        - **Intrinsic Content: .795**
        - **Extrinsic Content: 1.00**
        - **Autonomy-Supportive Content: .701**
        - **Controlling Content: -.024**
- Once agreement was reached on *Final Coding Set 2B*, Coder A pasted the results into *Final Results Set 2B.*

April 18-23rd, 2019

- Coders A and C coded *Final Coding Set 3C* and met to discuss disagreement
    - Intercoder reliability for *Final Coding Set 3C* (Krippendorf's alpha; 1 coders; 22 responses):

        - **Rationale Provided: .882**
        - **Intrinsic Content: .816**
        - **Extrinsic Content: .779**
        - **Autonomy-Supportive Content: .104**
        - **Controlling Content: 1.00**
- Once agreement was reached on *Final Coding Set 3C*, Coder A pasted the results into *Final Results Set 3C*.

April 19th & May 18th, 2019

- Coders A and B coded *Final Coding Set 3B* and met on April 19th to discuss disagreement
    - Intercoder reliability for *Final Coding Set 3B* (Krippendorf's alpha; 2 coders; 22 responses):
        - **Rationale Provided: .893**
        - **Intrinsic Content: .733**
        - **Extrinsic Content: 1.00**
        - **Autonomy-Supportive Content: -.024**
        - **Controlling Content: .338**
- Once agreement was reached the first 16 responses in *Final Coding Set 3B*, Coder A pasted the results into *Final Results Set 3B.* Then, on May 18th, Coders A and B met to discuss agreement on the remaining 6 responses, and Coder A pasted those results into *Final Results Set 3B,* making note of which responses Coder C would need to be consulted on.
- Disagreement in *Final Coding Set 3B* that Coders A and B could not resolve on their own were resolved by Coder C on May 18th, and the results were pasted into *Final Results Set 3B.*

April 22nd, 2019

- Coder A randomly selected 1 set of 22 real teacher responses to Q#21 from the full dataset, as well as 3 sets of 20 responses (all without replacement), to be coded with Coder B (hereafter referred to as *Final Coding Sets 4B – 7B*). Coder A put each set into an Excel file where each row contained a response and each column represented a code from the initial coding frame.
    - Coder A also put each set into an Excel file that would hold the final coding decisions for each set (hereafter referred to as *Final Results Sets 4B-7B*).
- Coder A also randomly selected 4 sets of 20 real teacher responses to Q#21 from the full dataset, without replacement, to be coded with Coder C (hereafter referred to as *Final Coding Sets 4C – 7C*). Coder A put each set into an Excel file where each row contained a response and each column represented a code from the initial coding frame.
    - Coder A also put each set into an Excel file that would hold the final coding decisions for each set (hereafter referred to as *Final Results Sets 4C-7C*).

April 22nd - 30th, 2019

- Coders A and C coded *Final Coding Set 4C* and met to discuss disagreement

- Intercoder reliability for *Final Coding Set 4C* (Krippendorf's alpha; 2 coders; 20 responses):
  - **Rationale Provided: .860**
  - **Intrinsic Content: .860**
  - **Extrinsic Content: 1.00**
  - **Autonomy-Supportive Content: .618**
  - **Controlling Content: .86**

- Once agreement was reached on *Final Coding Set 4C*, Coder A pasted the results into *Final Results Set 4C*.

April 24th – May 1st, 2019

- Coders A and B coded *Final Coding Set 4B* and met to discuss disagreement
  - Intercoder reliability for *Final Coding Set 4B* (Krippendorf's alpha; 2 coders; 22 responses):
    - **Rationale Provided: -.024**
    - **Intrinsic Content: .590**
    - **Extrinsic Content: 1.00**
    - **Autonomy-Supportive Content: .747**
    - **Controlling Content: -.049**
- Once agreement was reached on most of the responses in *Final Coding Set 4B*, Coder A pasted the results into *Final Results Set 4B,* making note of which responses Coder C would need to be consulted on.
- Disagreement in *Final Coding Set 4B* that Coders A and B could not resolve on their own were resolved by Coder C on May 18th, and the results were pasted into *Final Results Set 4B.*

April 24th - May 2nd, 2019

- Coders A and C coded *Final Coding Set 5C* and met to discuss disagreement
  - Intercoder reliability for *Final Coding Set 5C* (Krippendorf's alpha; 2 coders; 20 responses):
    - **Rationale Provided: .772**
    - **Intrinsic Content: .609**
    - **Extrinsic Content: -.031**
    - **Autonomy-Supportive Content: .683**
    - **Controlling Content: 1.00**
- Once agreement was reached on *Final Coding Set 5C*, Coder A pasted the results into *Final Results Set 5C*.

April 26th – May 1st, 2019

- Coders A and B coded *Final Coding Set 5B* and met to discuss disagreement
  - Intercoder reliability for *Final Coding Set 5B* (Krippendorf's alpha; 2 coders; 20 responses):
    - **Rationale Provided: .695**
    - **Intrinsic Content: .786**
    - **Extrinsic Content: 1.00**
    - **Autonomy-Supportive Content: .458**

        - **Controlling Content: .331**
- Once agreement was reached on *Final Coding Set 5B*, Coder A pasted the results into *Final Results Set 5B.*

May 1st – 2nd, 2019

- Coders A and C coded *Final Coding Set 6C* and met on May 16th to discuss disagreement
    - Intercoder reliability for *Final Coding Set 6C* (Krippendorf's alpha; 1 coders; 20 responses):
        - **Rationale Provided: .740**
        - **Intrinsic Content: .511**
        - **Extrinsic Content: .458**
        - **Autonomy-Supportive Content: .458**
        - **Controlling Content: .777**
- Once agreement was reached on most responses in *Final Coding Set 6C*, Coder A pasted the results into *Final Results Set 6C*, making note of which responses Coder B would need to be consulted on.
- Disagreement in *Final Coding Set 6C* that Coders A and C could not resolve on their own were resolved by Coder B on May 18th, and the results were pasted into *Final Results Set 6C.*

May 2nd, 2019

- Coder A randomly selected 1 set of 20 real teacher responses to Q#21 from the full dataset, without replacement, to be coded with Coder B (hereafter referred to as *Final Coding Set 8B*). Coder A put this set into an Excel file where each row contained a response and each column represented a code from the initial coding frame.
    - Coder A also put this set into an Excel file that would hold the final coding decisions for this set (hereafter referred to as *Final Results Set 8B*).
- Coder A also randomly selected 1 set of 20 real teacher responses to Q#21 from the full dataset, without replacement, to be coded with Coder C (hereafter referred to as *Final Coding Set 8C*). Coder A put this set into an Excel file where each row contained a response and each column represented a code from the initial coding frame.
    - Coder A also put this set into an Excel file that would hold the final coding decisions for this set (hereafter referred to as *Final Results Set 8C*).

May 13th, 2019

- Coders A and B coded *Final Coding Set 7B* and met to discuss disagreement
    - Intercoder reliability for *Final Coding Set 7B* (Krippendorf's alpha; 2 coders; 20 responses):
        - **Rationale Provided: .878**
        - **Intrinsic Content: .902**
        - **Extrinsic Content: .649**
        - **Autonomy-Supportive Content: 1.00**
        - **Controlling Content: .458**

- Once agreement was reached on most of the responses in *Final Coding Set 7B*, Coder A pasted the results into *Final Results Set 7B*, making note of which responses Coder C would need to be consulted on.
- Disagreement in *Final Coding Set 7B* that Coders A and B could not resolve on their own were resolved by Coder C on May 18th, and the results were pasted into *Final Results Set 7B.*

May 14th, 2019

- Coders A and B coded *Final Coding Set 6B* and met to discuss disagreement
  - Intercoder reliability for *Final Coding Set 6B* (Krippendorf's alpha; 2 coders; 20 responses):
    - **Rationale Provided: .860**
    - **Intrinsic Content: .786**
    - **Extrinsic Content: .831**
    - **Autonomy-Supportive Content: 1.00**
    - **Controlling Content: .618**
  - Once agreement was reached on most of the responses in *Final Coding Set 6B*, Coder A pasted the results into *Final Results Set 6B*, making note of which responses Coder C would need to be consulted on.
  - Disagreement in *Final Coding Set 6B* that Coders A and B could not resolve on their own were resolved by Coder C on May 18th, and the results were pasted into *Final Results Set 6B.*
- Coders A and B coded *Final Coding Set 8B* and met to discuss disagreement
  - Intercoder reliability for *Final Coding Set 8B* (Krippendorf's alpha; 2 coders; 20 responses):
    - **Rationale Provided: .896**
    - **Intrinsic Content: .902**
    - **Extrinsic Content: 1.00**
    - **Autonomy-Supportive Content: .000**
    - **Controlling Content: .618**
  - Once agreement was reached on most of the responses in *Final Coding Set 8B*, Coder A pasted the results into *Final Results Set 8B*, making note of which responses Coder C would need to be consulted on.
  - Disagreement in *Final Coding Set 8B* that Coders A and B could not resolve on their own were resolved by Coder C on May 18th, and the results were pasted into *Final Results Set 8B.*
- Coders A and C coded *Final Coding Set 7C* and met to discuss disagreement
  - Intercoder reliability for *Final Coding Set 7C* (Krippendorf's alpha; 2 coders; 20 responses):
    - **Rationale Provided: .780**
    - **Intrinsic Content: .794**
    - **Extrinsic Content: .648**
    - **Autonomy-Supportive Content: -.028**
    - **Controlling Content: 1.00**

- Once agreement was reached on *Final Coding Set 7C*, Coder A pasted the results into *Final Results Set 7C*.

- Coders A and C also coded *Final Coding Set 8C* and met to discuss disagreement
  - Intercoder reliability for *Final Coding Set 8C* (Krippendorf's alpha; 2 coders; 20 responses):
    - **Rationale Provided: .878**
    - **Intrinsic Content: .610**
    - **Extrinsic Content: .831**
    - **Autonomy-Supportive Content: .000**
    - **Controlling Content: .740**
  - Once agreement was reached on most responses in *Final Coding Set 8C*, Coder A pasted the results into *Final Results Set 8C*, making note of which responses Coder B would need to be consulted on.
  - Disagreement on *Final Coding Set 8C* that Coders A and C could not resolve on their own were resolved by Coder B on May 18th and the results were pasted into *Final Results Set 8C.*

May 15th, 2019

- Coder A randomly selected 1 final set of 15 real teacher responses to Q#21 from the full dataset, without replacement, to be coded with Coder B (hereafter referred to as *Final Coding Sets 9B*). Coder A put this set into an Excel file where each row contained a response and each column represented a code from the initial coding frame. Coder A also put the 6 responses from *Final Results Set 3B* that Coders A and B had not yet discussed agreement on into this file. Lastly, Coder A also put 4 responses that Coders A and C had not been able to come to an agreement on into this file, so that Coder B could resolve these disagreements.
  - Coder A then copied this set of 25 responses into an Excel file that would hold the final coding decisions for this set (hereafter referred to as *Final Results Sets 9B*).
- Coder A also randomly selected 1 final set of 10 real teacher responses to Q#21 from the full dataset, without replacement, to be coded with Coder C (hereafter referred to as *Final Coding Set 9C*). Coder A put this set into an Excel file where each row contained a response and each column represented a code from the initial coding frame. Coder A also put 11 responses that Coders A and B had not been able to come to an agreement on into this file, so that Coder C could resolve these disagreements.
  - Coder A then copied this set of 21 responses into an Excel file that would hold the final coding decisions for each set (hereafter referred to as *Final Results Set 9C*).

May 16th - 18th, 2019

- Coders A and C coded *Final Coding Set 9C* and met to discuss disagreement
  - Intercoder reliability for *Final Coding Set 9C* (Krippendorf's alpha; 2 coders; 21 responses):
    - **Rationale Provided: .241**

        - .627 for the 10 novel responses
    - **Intrinsic Content: .397**
        - 1.00 for the 10 novel responses
    - **Extrinsic Content: .461**
        - .000 for the 10 novel responses
    - **Autonomy-Supportive Content: .650**
        - 1.00 for the 10 novel responses
    - **Controlling Content: .335**
        - 1.00 for the 10 novel responses
- Once agreement was reached on most responses in *Final Coding Set 9C,* Coder A pasted the results into *Final Results Set 9C*, making note of which responses Coder B would need to be consulted on.
- Disagreement on *Final Coding Set 9C* that Coders A and C could not resolve on their own were resolved by Coder B on July 7th and the results were pasted into *Final Results Set 9C.*

May 18th, 2019

- Coders A and B coded *Final Coding Set 9B* and met to discuss disagreement
    - Intercoder reliability for *Final Coding Set 9B* (Krippendorf's alpha; 2 coders; 25 responses):
        - **Rationale Provided: .755**
            - **.642** for the 15 novel responses
        - **Intrinsic Content: .750**
            - **.710** for the 15 novel responses
        - **Extrinsic Content: .467**
            - **.642** for the 15 novel responses
        - **Autonomy-Supportive Content: -.043**
            - **-.036** for the 15 novel responses
        - **Controlling Content: .806**
            - **.847** for the 15 novel responses
- Once agreement was reached on most of the responses in *Final Coding Set 9B*, Coder A pasted the results into *Final Results Set 9B*, making note of which responses Coder C would need to be consulted on.
- Disagreement in *Final Coding Set 9B* that Coders A and B could not resolve on their own were resolved by Coder C on May 18th, and the results were pasted into *Final Results Set 9B.*

For each code, interrater reliability calculated across the entire dataset was as follows:

Code	**Percent Agreement**	**Krippendorf's alpha**
Rationale Provided	92.9%	.809
Intrinsic Content	86.3%	.717
Extrinsic Content	95.3%	.664
Autonomy-Supportive Language	89.7%	.531

Controlling Language	90.2%	.563

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